TOWN OF PETERBOROUGH CONTOOCOOK RIVER URBAN STORMWATER IMPROVEMENTS AND LOW IMPACT DEVELOPMENT (LID) DEMONSTRATION PROJECT

A Final Report to

The New Hampshire Department of Environmental Services

Submitted by

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1 Grove Street
Peterborough, NH 03458

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Funding for this project was provided in part by a Watershed Assistance Grant from the NH Department of Environmental Services with Clean Water Act Section 319 funds from the U.S. Environmental Protection Agency.

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Executive Summary

Project Description

The Contoocook River Urban Stormwater Improvements and Low Impact Development (LID) Demonstration project is located in the downtown area of Peterborough, New Hampshire in an area that drains to the Contoocook River, an impaired waterbody listed on the NH 2004 305(b)/303(d) Surface Water Quality Report. The current downtown area discharges untreated stormwater into the river. Previous studies have identified nonpoint source (NPS) stormwater as a contributor of bacteria and nutrients in the Contoocook River. The project included the installation of a number of Low Impact Development (LID) stormwater Best Management Practice (BMP) structures including:

1. Four deep sump leaching catch basins along School and Depot Streets;
2. Approximately 100 linear feet of perforated drainage pipe infiltration trench;
3. A raingarden in the Depot Square parking lot;
4. A pervious infiltration divider strip in the Wall Street municipal parking lot;
5. Two raingardens and infiltration beds (from roof leaders) at the Town House;
6. Replacement of an impervious concrete sidewalk with a pervious brick sidewalk (ADA compliant).

The project will address NPS stormwater runoff associated with the downtown area directly adjacent to the Contoocook River. Pollutants contained in stormwater targeted for treatment include total suspended solids (TSS), phosphorus, nitrogen, and bacteria. Additionally, vehicle fluid leakage from cars and trucks as well as litter, road salt, and sand currently flushed into the river will be addressed. This project is expected to have beneficial water quality impacts on the important drinking water aquifer, the North Aquifer, which is immediately downstream of this area.

Original Outcome Statement

"The ultimate purpose of this project is to improve water quality and wildlife habitat within the Contoocook River. This will also provide an excellent opportunity for public education and technology transfer since several of the proposed BMPs incorporate LID techniques which will be located in the heavily traveled downtown area of Peterborough, NH, ultimately promoting local and regional LID and infiltration. Additionally, the Town's sole water supply aquifer, the North Aquifer, lies immediately downstream of this area. The project is expected to have beneficial water quality impacts on this important drinking water aquifer that is hydrologically connected to the Contoocook River. This project will also address several goals in the New Hampshire Nonpoint Source Management Plan."

Final Project Outcome

The final project outcome is an excellent demonstration project which illustrates several different LID BMPs while improving the water quality entering the Contoocook River. In addition lost groundwater recharge from high density imperviousness is re-established. The

project outreach component also raised awareness with local businesses and DPW staff which will in turn provide advocacy for the LID demonstration component and future practices.

Project Summary

Project Start Date:	12/05/06
Project End Date:	12/31/08
Total project Costs:	$202,028.38
Final Match:	52%

Funding Sources:

Grant:	$104,990.00
In-kind Match:	$ 7,543.10
DPW Budget:	$ 89,495.28

Project Partners:

- Town of Peterborough- Department of Public Works
- Town of Peterborough- Water Resources Advisory Committee
- Dr. Michael Gordon & Garden Volunteers
- Comprehensive Environmental Inc. (CEI)

Performance Target 1: Improve stormwater treatment in downtown area to remove sediment, infiltrate first flush and enhanced recharge.

The Performance Target was met through installation of the BMPs noted in the Project Description above, verified by modeling and field monitoring.

Performance Target 2: Five downtown business owners and DPW staff adopt behaviors that support efforts to reduce stormwater or NPS impacts on the water quality of the Contoocook River.

This Performance Target was met through successful completion of an outreach program which educated Downtown business owners and DPW employees.

Introduction

Background Information

The proposed project is located in the downtown area of Peterborough, New Hampshire in an area that drains to the Contoocook River, an impaired waterbody listed on the NH 2004 305(b)/303(d) Surface Water Quality Report. The current downtown area discharges untreated stormwater into the river. Previous studies have identified nonpoint source (NPS) stormwater as a contributor of bacteria and nutrients in the Contoocook River.

Funding Rationale

The Town of Peterborough DPW in conjunction with the efforts of the Water Resource Advisory Committee elected to seek grant funding through DES due to their desire to target stormwater pollution and improve water quality in the Contoocook River. Grant funds allowed the Town to enhance their dedicated funds and complete a more substantial LID demonstration project.

Project Area

The project area comprising portions of the downtown area of Peterborough, NH is shown in Figure 1 below. The downtown area is comprised of largely impervious coverage including multiple buildings, sidewalk and streets. The project area is bordered mainly by Main Street, Grove Street, School Street, Depot Street and municipal parking lots on either side of the latter. Drainage is collected by a series of catch basins and discharges to the Contoocook River.

Figure 1- Downtown Peterborough

12-digit hydrologic unit code (HUC)
The HUC number is 010700030104.

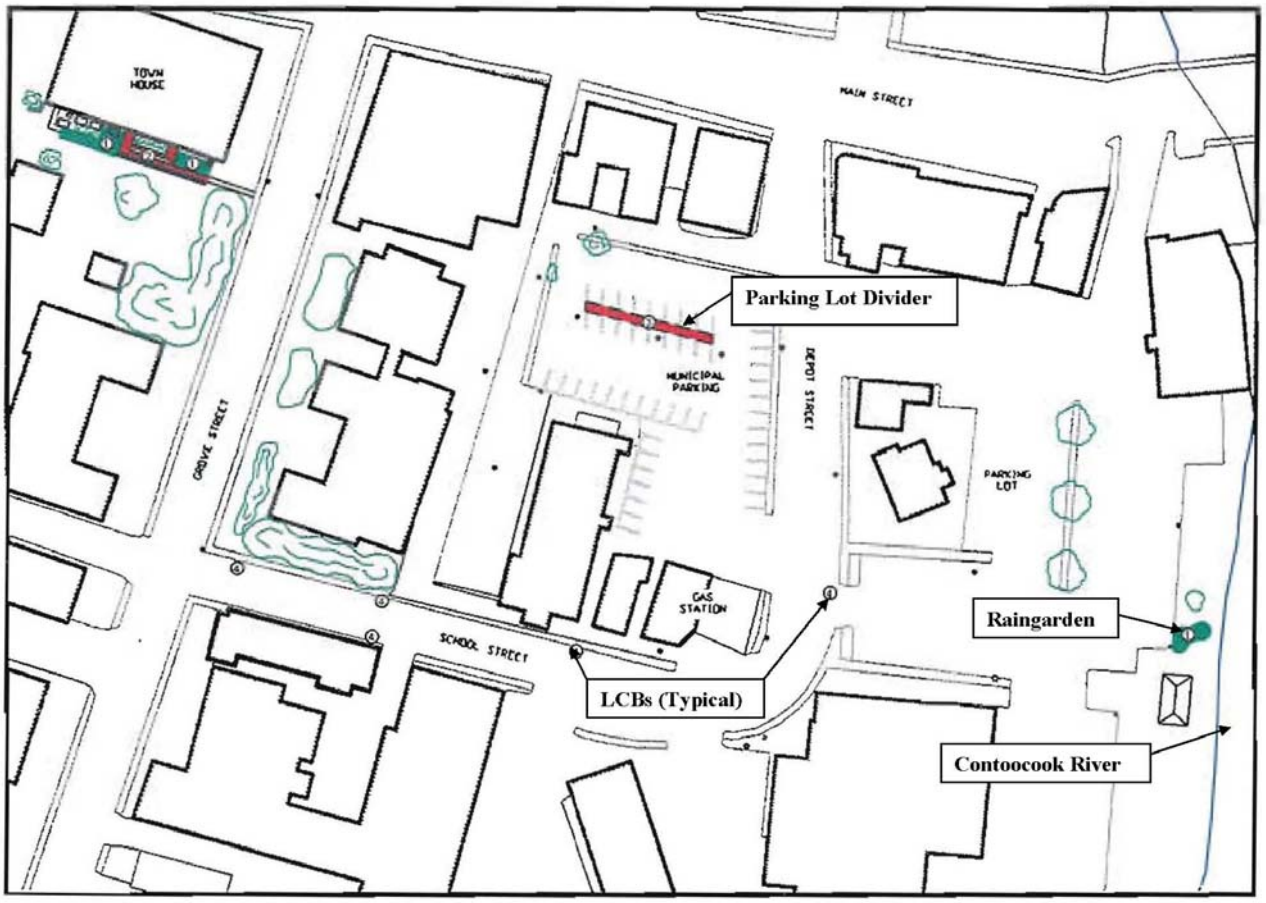
Outcome Statement
The ultimate purpose of this project is to improve water quality and wildlife habitat within the Contoocook River. The project will also provide an excellent opportunity for public education and technology transfer since several of the proposed BMPs incorporate LID techniques which will be located in the heavily traveled downtown area of Peterborough, ultimately promoting local and regional LID and infiltration. Additionally, the Town's sole water supply aquifer, the North Aquifer, lies immediately downstream of this area. The project is expected to have beneficial water quality impacts on this important drinking water aquifer that is hydrologically connected to the Contoocook River. This project will also address several goals in the New Hampshire Nonpoint Source Management Plan.

Nonpoint Source Pollutants Targeted
Pollutants contained in stormwater targeted for treatment include total suspended solids (TSS), phosphorus, nitrogen, and bacteria. Additionally, vehicle fluid leakage from cars and trucks as well as litter, road salt, and sand currently flushed into the river will be addressed.

Best Management Practices (BMPs)
The following BMPs were installed at the locations shown on project plans found in Appendix C.

- Installation of four deep-sump, leaching catch basins along School and Depot Streets;
- Installation of approximately 100 linear feet of perforated drainage pipe infiltration trench along Depot Street;
- Installation of a raingarden in the Depot Square parking lot;
- Installation of a pervious infiltration divider in the Wall Street municipal parking lot; and,
- Installation of two raingardens and infiltration beds (from roof leaders) at the Town House on Grove Street.

Watershed Map



Project Performance Targets and Milestones

The following are the Performance Targets and Milestones for the project. It should be noted that two of the milestones changed during the development of the project. The first change was in Milestone 1A where four leaching catch basins and one infiltration pipe were installed in lieu of five leaching basins.

The second change involved Milestone 1E, the proposed sand filter at the corner of School and Depot Streets. Upon further consideration by Town officials, several concerns arose including a hesitation to set a precedent of treatment of runoff from private property by the Town, particularly one with a higher potential pollutant load. Additionally, the sand in the sand filter would eventually create a disposal concern for the Town with unpredictable levels of contaminants and might require costly disposal placing undue burden on the Town. Finally, following preliminary design and sizing of the required structure it became difficult to place the unit both horizontally and vertically within site constraints in the area. In lieu of the sand filter the scope of the infiltration area at the Town House was expanded to include runoff from both sides of the roof as well as removal of an impervious concrete sidewalk and replacement with permeable sidewalk pavers. The latter provides an extra dimension of demonstration to the project.

Performance Target 1: Improve stormwater treatment in downtown area to remove sediment, infiltrate first flush and enhanced recharge.

Verification: BMP effectiveness is modeled and periodic inspections are conducted to verify infiltration and measure sediment volumes collected as specified in QAPP to confirm that sediment is being removed and infiltration is being achieved.

Milestone 1A: Five existing sump-less catch basins are converted to new deep sump leaching catch basins. **Four leaching basins were actually installed rather than the proposed five. At one location a perforated drainage pipe/infiltration trench was installed in lieu of the fifth basin.**

Task 1: Conduct preliminary engineering collecting relevant existing data and collect elevation information by field survey of BMP sites.
Task 2: Perform BMP structure designs and prepare details suitable for bid.
Task 3: Prepare site plans and technical specifications for construction.
Task 4: Town and DES review/comment of plans.
Task 5: Public bid, award to contractor and hold pre-construction meeting.
Task 6: Contractor submits proposed material submittals for approval and constructs basins according to plan and details.
Task 7: Inspection and construction documentation to verify basins are constructed according to approved plans.

Milestone 1B: A raingarden is installed in municipal parking lot #2.

Task 8: Conduct preliminary engineering collecting relevant existing data and collect elevation information by field survey of BMP sites.
Task 9: Perform BMP structure designs and prepare details suitable for bid.
Task 10: Prepare site plans and technical specifications for construction.
Task 11: Town and DES review/comment of plans.
Task 12: Public bid, award to contractor and hold pre-construction meeting.
Task 13: Contractor submits proposed material submittals for approval and constructs basins according to plan and details.
Task 14: Inspection and construction documentation to verify basins are constructed according to approved plans.

Milestone 1C: Parking lot infiltration dividers are installed in municipal parking lot #1.

Task 15: Conduct preliminary engineering collecting relevant existing data and collect elevation information by field survey of BMP sites.
Task 16: Perform BMP structure designs and prepare details suitable for bid.
Task 17: Prepare site plans and technical specifications for construction.
Task 18: Town and DES review/comment of plans.
Task 19: Public bid, award to contractor and hold pre-construction meeting.
Task 20: Contractor submits proposed material submittals for approval and constructs basins according to plan and details.
Task 21: Inspection and construction documentation to verify basins are constructed according to approved plans.

Milestone 1D: Raingardens with overflows to drywells are installed to collect roof leader flows from the Town House (town offices).

Task 22: Conduct preliminary engineering collecting relevant existing data and collect elevation information by field survey of BMP sites.
Task 23: Perform BMP structure designs and prepare details suitable for bid.
Task 24: Prepare site plans and technical specifications for construction.
Task 25: Town and DES review/comment of plans.
Task 26: Public bid, award to contractor and hold pre-construction meeting.
Task 27: Contractor submits proposed material submittals for approval and constructs basins according to plan and details.
Task 28: Inspection and construction documentation to verify basins are constructed according to approved plans.

Milestone 1E: A new catch basin and sand filter structure are installed downstream of the gas station located at the corner of School and Depot streets. **Milestone changed to expanded roof runoff infiltration and installation of a pervious sidewalk to replace a concrete impervious sidewalk at the Town House.**

Task 29: Conduct preliminary engineering collecting relevant existing data and collect elevation information by field survey of BMP sites.

Task 30: Perform BMP structure designs and prepare details suitable for construction by DPW.
Task 31: Prepare site plans and technical specifications for construction.
Task 32: Town and DES review/comment of plans.
Task 33: Brief DPW on construction plans and details.
Task 34: DPW constructs basins according to plan and details.
Task 35: Inspection and construction documentation to verify basins are constructed according to approved plans.

Milestone 1F: Effects of installing BMPs on water quality are assessed according to approved QAPP.

Task 36: Complete an abbreviated QAPP according to DES Guidance.
Task 37: Conduct modeling to estimate pollutant removals achieved by BMPs.
Task 38: Perform monitoring as detailed in the approved QAPP.

Performance Target 2: Five downtown business owners and DPW staff adopt behaviors that support efforts to reduce stormwater or NPS impacts on the water quality of the Contoocook River.

Verification: Change in Behavior (by measurement of changes in behavior as determined during development of an Outreach Plan and may include surveys of items noted below)

- x number of businesses commit to install BMPs around their business;
- x number of project brochures/handouts distributed by businesses;
- x number of DPW staff attend training workshop;
- DPW staff document something that they do differently as result of training.

Milestone 2A: Outreach plan for downtown business owners and DPWs is created. Two different "tracks" will be used to implement the plan using the materials developed; one for the downtown business owners and one for DPW staff training.

Task 39: DES meets with Water Resource Committee, other volunteer groups, two members of DPW staff and two downtown business owners to facilitate development of Outreach Plan.
Task 40: Volunteers hold two follow-up meetings to develop Plan.
Task 41: Submit plan for DES review and comment.

Milestone 2B: Five downtown business owners understand the benefits of Low Impact Development (LID) techniques.

Task 42: Based on Outreach Plan developed, prepare materials and distribute to Downtown business owners, DPW staff, in the kiosk located at Depot Square municipal parking lot #2, on the Town's website, and other outlets determined during plan development.
Task 43: Based on Outreach Plan developed, hold an event/meeting or other method identified during plan development to present materials to downtown business owners and DPW staff.

Milestone 2C: Two downtown businesses and DPW staff members sign-on to commit to adopt (one or more) changes in behavior to reduce stormwater or NPS impacts on the river's water quality.

Task 44: During the event/meeting noted in Milestone 2B above, obtain the commitment from two of the owners of downtown businesses and DPW staff. The nature of the desired commitment will be determined during plan implementation.

Task 45: Verify implementation of Milestone 2C by surveying DPW staff 3 months after commitment to verify changes in behavior and document in writing for inclusion in the Final Report what the two downtown business owners changed regarding stormwater impacts from their sites.

Project final and quarterly report Tasks:

Task 46: Submit electronic quarterly reports documenting all work performed on the project.

Task 47: Submit draft version of the final report for DES review and comment at least one-month prior to the project completion date.

Task 48: Submit a comprehensive final report in both electronic and hard-copy to DES on or before the project completion date.

Project Performance Target Verification

Performance Target 1- *Improve stormwater treatment in downtown area to remove sediment, infiltrate first flush and enhance recharge.*

The performance target for installation of the BMPs was met in a highly successful manner. Despite challenging site constraints and with excellent coordination between the DPW and the design engineer, Comprehensive Environmental Inc. (CEI), some challenging design issues were overcome and resulted in development of the plans and specifications. The bid process resulted in selection of an excellent Contractor, Mathewson Companies of Hancock, NH. The workmanship and professional approach employed by Mathewson resulted in a very successful and smooth construction process with minimal delay and impact to businesses in the busy downtown area. The finished product will act as an excellent demonstration for various types of LID BMPs.

Through design and construction of properly sized BMPs the first flush of stormwater is now being treated for a significant portion of downtown Peterborough. The BMPS were designed to provide sediment removal through deep sumps or regular maintenance of the raingardens and provide

Performance Target 2- *Five downtown business owners and DPW staff adopt behaviors that support efforts to reduce stormwater or NPS impacts on the water quality of the Contoocook River.*

The outreach component of the project as documented in Appendix A was successful in the planning stages. The Water Resource Advisory Committee (WRAC) dedicated several hours of their meetings to development of the planning and execution component of the outreach plan. In conjunction with DES a good plan was developed and downtown business owners notified directly by mail, by word of mouth and direct contact through visits to the stores. Two targeted meeting were scheduled but were not well attended. The goal of reaching two owner's and getting some sort of commitment was not reached do to lack of response. A few owners did attend one of the outreach meetings and agreed to be distribution points for information regarding the project with Roy's Market being the strongest. The owner of the movie theater adjacent to the Wall Street municipal lot was the next strongest respondent but was mainly concerned that drainage of the parking lot would not be impacted by construction. Between the Depot Square information kiosk, the Town House and Roy's Market, the Town and WRAC are confident that the level of awareness for the project will continue to be enhanced.

Project Outcomes & Measurable Results

The targeted outcome for the project was construction of drainage Best Management Practices designed to reduce nonpoint source pollutant loading on the Contoocook River which the project was successful in achieving. The steps taken to determine success were as follows:

1. Construction of the BMPs according to design plans and specifications verified by periodic construction inspection during implementation.
2. Completion of modeling (see Appendix B) for the BMPs according to the QAPP.
3. Field monitoring of the BMPs (see Appendix B) during and after storms to verify operation.

The following BMPs were constructed:

1. Four leaching catch basins were constructed along School and Depot Streets. The basin locations and designs are as shown in Appendix C. The design consisted of replacement of existing basins with deep sump basins with leaching sections surrounded by a two foot wide band of crushed stone (see Photographs). The existing outlet pipes were fitted with hoods for floatable retention and remain to act as overflows. Follow-up monitoring confirm the basins drain within 72 hours.

   Estimated pollutant removal:

   TSS- 488 lbs.
   TP- 0.2 lbs.
   TN- 1.2 lbs.

2. Approximately 100 linear feet of drainage pipe was replaced with perforated drainage pipe to enhance infiltration. Designs are shown in Appendix C. One of the deep sump hooded leaching catch basins acts as pre-treatment for this length of pipe.

   Estimated pollutant removal:

   TSS- 122 lbs.
   TP- 0.05 lbs.
   TN- 0.3 lbs.

3. A raingarden was installed behind the curb line of the municipal parking off Depot Street. Designs are shown in Appendix C. The existing curb was removed for a section to allow runoff to sheet flow into the raingarden and if the depressed garden ever fills up, the existing basin acts as an overflow. Follow-up monitoring confirms the gardens drain within 72 hours.

   Estimated pollutant removal:

TSS- 127 lbs.
TP- 0.05 lbs.
TN- 0.3 lbs.

4. An infiltration strip was installed in a low point of the municipal parking lot off Wall and Depot Streets. Designs are shown in Appendix C. The strip was constructed of porous pavers underlain by a filter layer of bedding material and a three foot depth of crushed stone.

   Estimated pollutant removal:

   TSS- 309 lbs.
   TP- 0.22 lbs.
   TN- 1.2 lbs.

5. Roof runoff from both sides of the Town House (town offices) roof were redirected from drain lines to newly constructed raingardens and subsurface infiltration beds. Designs are shown in Appendix C. Follow-up monitoring confirmed the gardens drain prior to 72 hours following the end of the storm.

   Estimated pollutant removal:

   TSS- 34 lbs.
   TP- 0.14 lbs.
   TN- 1.7 lbs.

6. An existing concrete sidewalk serving the lower level of the Town House (town offices) was replaced with porous sidewalk (Aqua-Bric TM) pavers adjacent to the new roof runoff raingardens. Designs are shown in Appendix C.

   Estimated pollutant removal:

   TSS- 8 lbs.
   TP- 0.02 lbs.
   TN- 0.1 lbs.

7. The success of the outreach component resulted in only one downtown owner raising awareness or changing behavior.

Conclusions and Recommendations

The targeted outcome of this project was to improve water quality and wildlife habitat within the Contoocook River. The final project outcome is an excellent demonstration project which illustrates several different LID BMPs while improving the water quality entering the Contoocook River. In addition lost groundwater recharge from high density imperviousness was re-established.

The project will also provide an excellent opportunity for public education and technology transfer since the project is located in the heavily traveled downtown area of Peterborough. The ultimate outcome of the outreach portion was not as successful as desired but did provide a basis for advocacy of LID downtown. With follow-up by the WRAC the Town will continue to reap benefits from the project.

Photographic Documentation

School Street- Pre-Construction-looking E with existing catch basins along the curb line on the right side of the photograph

School Street Leaching Catch Basin- Post-Construction- looking S during construction (typical)

Depot Street Municipal Lot Raingarden- Pre-Construction-looking SW toward the catch basin which receives gutter flow

Depot Street Municipal Lot Raingarden- Post-Construction- looking SE toward the Contoocook River

Depot Street Municipal Lot Raingarden- Post-Construction- looking S during heavy rains 11/25/08- note puddling

Depot Street Municipal Lot Raingarden- Post-Construction- looking S after heavy rains 11/16/08- 1.75" runoff from contributing area completely infiltrated within 24 hours following end of the storm

Wall Street Municipal Lot Porous Paver Divider- Post-Construction- looking W-location was previously subject to substantial puddling

Town House Roof Leader Raingardens- located on the south side of the Town House (town offices)- Pre-Construction- looking NE

Town House Roof Leader Raingardens- located on the south side of the Town House (town offices)- Post-Construction- looking NE

Town House Roof Leader Raingardens- Post-Construction- looking NE- Close-up

Town House Sidewalk- located on the south side of the
Town House (town offices)- Pre-Construction- looking W

Town House Porous Sidewalk- located on the south side of the
Town House (town offices)- Post-Construction- looking W

Wall Street Municipal Lot Porous Paver Divider- Post-Construction- looking E- during rain

School Street Leaching Catch Basin- Post-Construction- looking E- during rain

APPENDIX A

Minutes - Water Resource Advisory Committee, 01, October 2007

Meeting called to order 5:30pm

Present: Dick Freeman, Larry Schongar, Beth Alpaugh-Côté, and Liz Thomas - Board of Selectmen Liaison

Guests: Barbara McMillan - Department of Environmental Services (DES) and Matt Lundsted - CEI

Due to lack of a quorum the minutes were postponed to our next meeting.

Dick introduced Barbara McMillan of DES she is working with us on the part of the Educational part of our Grant responsibility. Matt Lundsted recapped the project and what Barbara would be doing.

Barbara then helped us with the Out Reach portion of the plan. We had agreed to educate the public about the Low Impact Development installations planned for Downtown, consisting of 5 (five) businesses and the Department of Public Works (DPW) about the Low Impact Development methods that will be used downtown, and how to reduce the businesses' and DPW's impact on the storm water run off quality.

Barbara helped us create charts listing our goals and what we might do to achieve them.

Who do we educate -
Businesses such as Depot Square landlords, Peter of Roy's, Center Town bldg. owner, Lake Sunapee Bank, the Toadstool, and the tenants of the buildings downtown should be educated.

Best Management Practices -
Winter maintenance - sweep more salt less
Building owners - roof drains to rain gardens
Pavement sealants - better choices, less toxic
Raised planters for roof run off
Eliminate impervious surfaces, create more flow through surfaces
Replace impervious surfaces with other material.
Town gardening practices - Garden Club, Dr. Gordon
BMP - Promote projects - get info out.

It was suggested we check the area against DES's One-Stop site on the Web for brownfield sites etc. Larry says there are 170 in Peterborough.

How to get people involved.
Barriers =B *Incentives* = I
B - Concerns about runoff getting worse, not better
I - Shop owners are green inclined - residents too, many are healthy living oriented

B - Impact on businesses during construction - parking - access to businesses
B - Cost
B - Mosquitoes in standing
I - Explain Design will have a 48-hour drainage time, some will be closed
I - Include the businesses in the project, early on
I - Tenants want it
I - Show it off to other towns and committees
B - Green seal for participating, recognition - press

Meeting - to answer questions and take input

Demonstrate storm water runoff
How does it impact us
This project
Which parts of the project can be dug up, and when? What is best for the businesses downtown
What are the business owners' concerns
Have Rodney Bartlett in the meeting
Invite Peter from Roy's to meeting
Present our ideas for their participation in, and get feedback of what they think is good and bad
Send out invitations, a survey of what their concerns are so we can address those right away at the meeting
Invite: Businesses, Town Committees, Conservancy

It was decided we would have an interim meeting Tuesday the 16th of October at the Town House starting at 5:30pm.

The meeting was adjourned at 7:23pm (the usual 7:00pm meeting had been canceled.)

Respectfully submitted,

Beth Alpaugh-Côté
Secretary WRAC

Town of Peterborough – Contoocook River Urban Stormwater Improvements and Low Impact Development (LID) Demonstration Project

Outreach Plan

To Address Performance Target #2: Five downtown business owners and DPW staff adopt behaviors that support efforts to reduce stormwater or NPS impacts on the water quality of the Contoocook River

1) Downtown Businesses: Who and what? Brainstorming on what the committee knows. Forward list to others and have town GIS person help with list.

- Many own their own parking lots
- Ocean Bank
- Depot Square Corporation (own parking lot) – 12 businesses
- Lake Sunapee
- Roys Market
- Little Roys Market (concerned about project and negative impacts, i.e., disrupt parking and creating more water flow)
- Medicine Shop – Center Town (Dr. Gordon is helping with plantings)
- Toad Stool – parking (doing BMPs for grant)
- Diner
- Compu-care
- Municpal Buildings
- Historical Society
- Dr. Gordon's Gardens
- U.S. Post Office
- Fernaldez Lawyers?
- Newspaper
- Bishop and Patterson Real Estate

2) Best Management Practices (BMPs) for Business: Brainstorming on possible BMPs for businesses to do. Need to create a check list with this and additions for them to choose from.

- Winter maintenance: Use alternatives to salt (make sure they don't have other environmental impacts. Apply less salt when possible, i.e., only apply to area being used, spread evenly or calibrate. Do regular (daily or day after storms would be great) sweeping of parking lots and sidewalks.
- Pavement sealants: Use more environmentally friendly product.
- Roof runoff: Provide infiltration opportunities, i.e., rain gardens, running gutters to pervious areas, raised street planters, green roofs.
- Impervious surfaces: Eliminate and replace with alternatives when possible, i.e., pavers with grass, pervious pavements, natural areas, gardens.

- Gardening and landscaping: Contact garden club and Dr. Gordon to confirm what they are doing for fertilizers, pesticides. Maybe check in with businesses on their practices.
- Promoting project: Train people at business to be able to talk about the project, provide signage, brochures, etc.

3) Barriers and Incentives for Businesses to Participate:

Barriers	**Incentives/Positives**
▪ Concerns about things getting worse rather than better	▪ Include them in on the process and address questions/concerns
▪ Impact on business during construction	▪ Residents that own shops like being "green" i.e., health shop, organic coffee shop, etc.
▪ Cost	▪ Provide recognition – Green seal, poster, press, website, kiosk
▪ Mosquitoes/standing water	▪ Explain design will have 48 hours drainage or closed system and rain gardens will have outflows
▪ Loss of parking space	▪ Creative ways to help with parking
▪ Store owners leasing out - lack of incentive	▪ Show off to other towns and river local advisory committees
	▪ Have tenants demand it

4) Businesses meeting to include them in on the process and address questions/concerns: Have a meeting that the businesses can attend to let them know:

Agenda ideas

a) How does the project impact them.
   - When can parking lots be dug up. Best time etc.
   - What are your concerns? Try to anticipate their concerns and address them up-front in a presentation (use list of barriers #3 above and ask others to add to it).

b) Explain water quality impacts from the businesses and residents, i.e., maybe use a model such as the Enviroscape (can borrow from DES).

c) Present our ideas for their participation to get their feedback on what they might be able to do and barriers and incentives (use list of BMPs from #2 above).

d) Get contact information from everyone! Maybe have them sign-up to meet with someone to talk more about how they can participate in BMPs.

Meeting logistics

a) Have the meeting at one of the downtown businesses.
b) Make sure that Little Roy owner is there (contact him ahead of time to help?)
c) Send invite with survey or question about "tell us what your concerns are" or include a survey at the meeting.
d) One on one informal questions?

5) Next Steps:

a) E-mail notes to others that were not at this meeting.

b) Forward list of businesses (#1) to others and have town GIS person help with list.

c) Who else to include: Nature Conservancy, Rotary, Lions, Chamber of Commerce, and Gen X Group.

d) Meet in 2 weeks to discuss meeting (include Rodney)
   - Come to consensus on what invite would say.
   - Set date, time (may be during the day for time that businesses area available), and location (downtown business if possible)
   - How to invite businesses (mailing list?) Should follow-up with one on one or door to door if you can.
   - Press for meeting
   - Speakers/facilitators

e) Start the ball rolling on DPW part of this grant performance target, i.e., "DPW staff adopt behaviors that support efforts to reduce stormwater or NPS impacts on the water quality of the Contoocook River."
   - Barbara McMillan at DES has a new Standard Operating Procedures Manual for Pollution Prevention and Good Housekeeping for Phase II DPWs. There is also a 1 ½ hour training that was done.

TOWN OF
PETERBOROUGH
Water Resources
Advisory Committee

1 Grove Street
Peterborough, NH 03458
Office: (603) 924-8000 x.100
Fax: (603) 924-8001
Web: www.townofpeterborough.com

06 November 2007

Re: Low Impact Development projects for Stormwater Management in the Downtown

Dear Downtown Property Owner,

In an effort to improve the quality of storm water run off in the downtown before it reaches the Contoocook River we are planning to construct Low Impact Development (LID) stormwater management structures in the downtown area. The Town has received a grant from the NH Department of Environmental Services in the amount of $125,000 to plan, construct, and educate the public about LID Stormwater Management. The construction is planned for 2008 and we are looking for your involvement and input in the process as this construction will affect your customers, tenants and your businesses. As with any construction in a busy downtown area there are inconveniences. Some of the LIDs will be under the street, some in gardens and others under parking lots. To minimize the impact on traffic and parking we ask for your help in planning this project.

The LIDs will benefit the river water quality and help control the storm water run off. LID Stormwater Management in your downtown will become a shining example of this technology and will attract visitors from surrounding communities, the state, and beyond, interested in better stormwater management for their towns.

We will be having two (2) question and answer sessions; the first one on Monday the 3rd of December at 6:00pm in the Town House and the second meeting Tuesday the 4th of December at 7:30 AM at the Town House. Light refreshments will be served.

If you are unable to attend please email your questions or concerns to Beth Alpaugh-Cote at AlpaughCote@Yahoo.com or Richard Freeman at rfmule@verizon.net or Rodney A. Bartlett at rbartlett@townofpeterborough.us or mail them to us;

Water Resource Advisory Committee
1 Grove Street
Peterborough, NH 03458

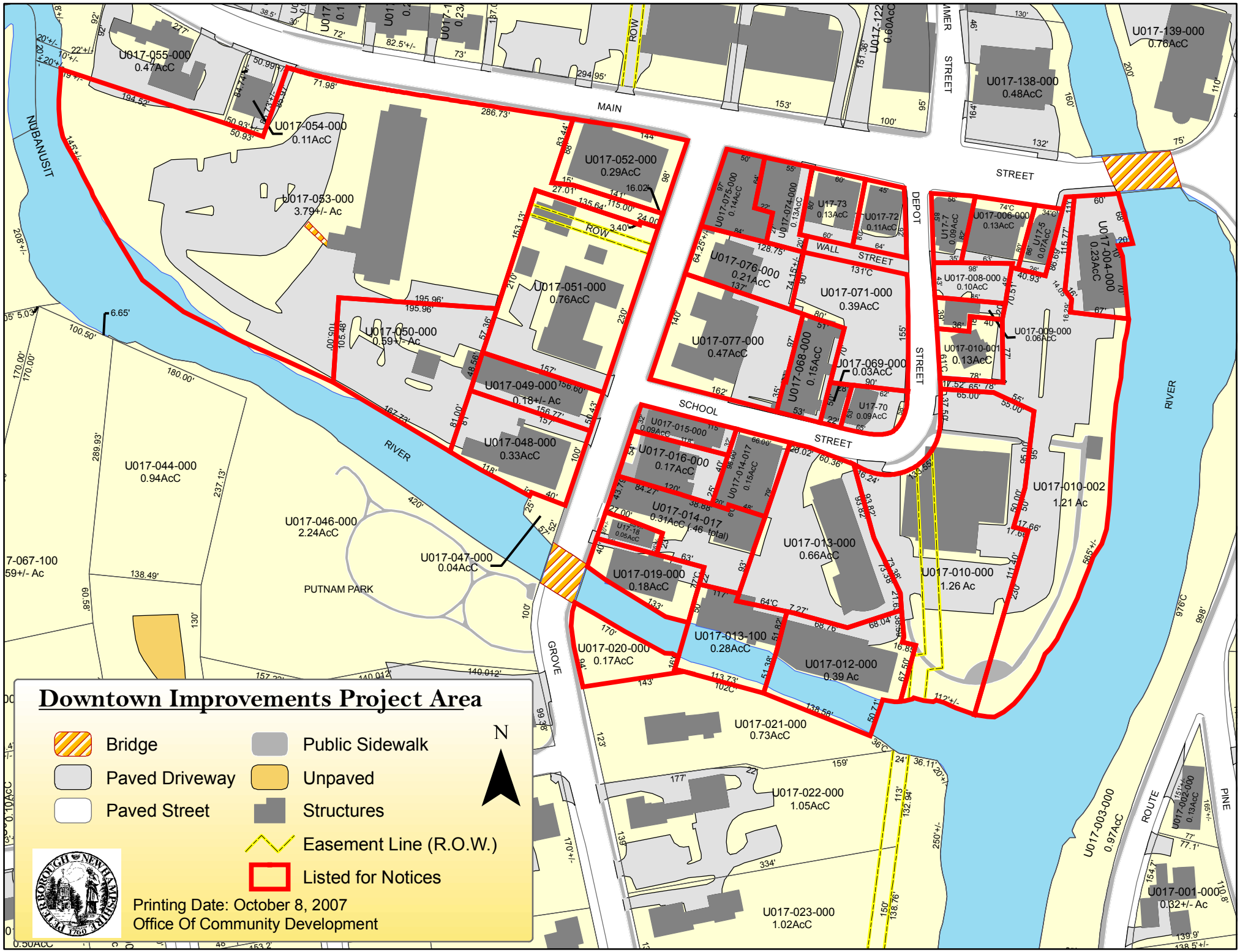
We will address your questions or concerns at the meeting. The minutes of the meeting, with answers to the questions we receive, will be available.

We look forward to seeing you at the meeting and please share this information with your tenants and other interested persons.

Sincerely,

The Water Resource Advisory Committee:

Richard Freeman, Chair
Beth Alpaugh-Côté, Secretary
Randy Brown
Audrey Cass
Larry Schongar
Liz Thomas - Board of Selectmen liaison
Rodney Bartlett - Department of Public Works liaison


Downtown Improvements Project Area
Bridge
Paved Driveway
Paved Street
Public Sidewalk
Unpaved
Structures
Easement Line (R.O.W.)
Listed for Notices
N
Printing Date: October 8, 2007
Office Of Community Development
MAIN
STREET
DEPOT
STREET
WALL
STREET
SCHOOL
STREET
GROVE
PUTNAM PARK
NUBANUSIT
RIVER
RIVER
ROUTE
PINE
U017-055-000
0.47AcC
U017-054-000
0.11AcC
U017-053-000
3.79+/- Ac
U017-052-000
0.29AcC
U017-051-000
0.76AcC
U017-050-000
0.59+/- Ac
U017-049-000
0.18+/- Ac
U017-048-000
0.33AcC
U017-044-000
0.94AcC
U017-046-000
2.24AcC
U017-047-000
0.04AcC
U017-075-000
0.14AcC
U017-074-000
0.13AcC
U017-073
0.13AcC
U017-072
0.11AcC
U017-076-000
0.21AcC
U017-071-000
0.39AcC
U017-077-000
0.47AcC
U017-068-000
0.15AcC
U017-069-000
0.03AcC
U017-070
0.09AcC
U017-015-000
0.09AcC
U017-016-000
0.17AcC
U017-014-017
0.15AcC
U017-014-017
0.31AcC (.46 total)
U017-018
0.05AcC
U017-019-000
0.18AcC
U017-020-000
0.17AcC
U017-013-100
0.28AcC
U017-013-000
0.66AcC
U017-012-000
0.39 Ac
U017-021-000
0.73AcC
U017-022-000
1.05AcC
U017-023-000
1.02AcC
U017-010-002
1.21 Ac
U017-010-000
1.26 Ac
U017-138-000
0.48AcC
U017-139-000
0.76AcC
U017-006-000
0.13AcC
U017-7
0.09AcC
U017-5
0.07AcC
U017-004-000
0.23AcC
U017-008-000
0.10AcC
U017-009-000
0.06AcC
U017-010-001
0.13AcC
U017-003-000
0.97AcC
U017-002-000
0.13AcC
U017-001-000
0.32+/- Ac

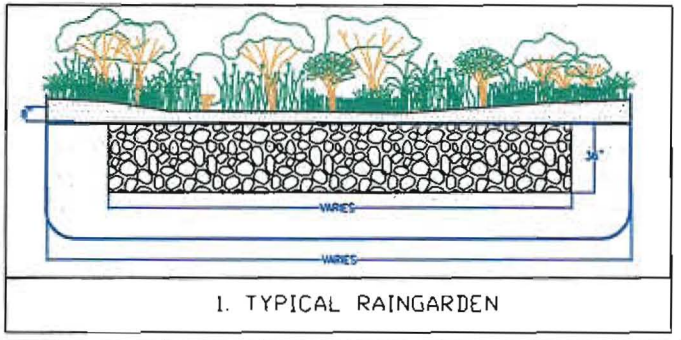
Assessing Acres	ACCOUNT_NO	OWNER_NAME	OWNER_NA_1	OWNER_NA_2	MAILING_AD	CITY	STATE	ZIP	LOCATION
0.23AcC	U017-004-000	HEALY, PHILIP B & LEE-ANN TRUSTEES	HANCOCK TRUST 2000		119 BOSTON POST ROAD	AMHERST	NH	03031	00002 MAIN ST
0.07AcC	U017-005-000	TEN MAIN LLC			10 MAIN STREET	PETERBOROUGH	NH	03458	00010 MAIN ST
0.13AcC	U017-006-000	WARD R. STOOPS REVOCABLE TRUST	STOOPS TRUSTEE, WARD R.		20 WINTER STREET	PETERBOROUGH	NH	03458	MAIN STREET
0.09AcC	U017-007-000	ROY, ALBERT E	ROY, ROLANDE A		18 MAIN ST	PETERBOROUGH	NH	03458	00018 MAIN ST
0.10AcC	U017-008-000	ROY, ALBERT E	ROY, ROLANDE A		18 MAIN ST	PETERBOROUGH	NH	03458	00018 MAIN ST
0.06AcC	U017-009-000	ROY, ALBERT E	ROY, ROLANDE A		18 MAIN ST	PETERBOROUGH	NH	03458	00018 MAIN ST
1.26 Ac	U017-010-000	TOADSTOOL INC			12 DEPOT ST	PETERBOROUGH	NH	03458	00012 DEPOT ST
0.13AcC	U017-010-001	THE PETERBOROUGH DINER, LLC			10 DEPOT STREET	PETERBOROUGH	NH	03458	DEPOT STREET
1.21 Ac	U017-010-002	PETERBOROUGH, TOWN OF			1 GROVE ST	PETERBOROUGH	NH	03458	DEPOT ST
0.39 Ac	U017-012-000	PETERBOROUGH DEPOT SQ LTD PARTNERSH	C/O CYRUS GREGG		PO BOX 322	PETERBOROUGH	NH	03458	00009 SCHOOL ST
0.66AcC	U017-013-000	PETERBOROUGH DEPOT SQ LTD PARTNERSH	C/O CYRUS GREGG		PO BOX 322	PETERBOROUGH	NH	03458	00011 SCHOOL ST
0.28AcC	U017-013-100	PETERBOROUGH DEPOT SQ LTD PARTNERSH	C/O CYRUS GREGG		PO BOX 322	PETERBOROUGH	NH	03458	DEPOT ST
0.15AcC (.46 AcC total)	U017-014-017	PETERBOROUGH DEPOT SQ LTD PRTNSHP	C/O CYRUS GREGG		PO BOX 322	PETERBOROUGH	NH	03458	GROVE & SCHOOL ST
0.31AcC (total .46 AcC)	U017-014-017	PETERBOROUGH DEPOT SQ LTD PRTNSHP	C/O CYRUS GREGG		PO BOX 322	PETERBOROUGH	NH	03458	GROVE & SCHOOL ST
0.09AcC	U017-015-000	JENFIELD INC			PO BOX 389	PETERBOROUGH	NH	03458	00026 GROVE STREET
0.17AcC	U017-016-000	ROBIN HILL REAL ESTATE HOLDINGS LLC	DONOVAN TIMOTHY P		28 GROVE ST	PETERBOROUGH	NH	03458	00028 GROVE ST
0.05AcC	U017-018-000	CABANA, ROGER L	CABANA, ALLISON D	C/O COLLEEN STONE	90 GROVE STREET	PETERBOROUGH	NH	03458	32 GROVE STREET
0.18AcC	U017-019-000	LANE, ARLENE MERCER			233 RIVERMEAD ROAD	PETERBOROUGH	NH	03458	00036 GROVE STREET
0.17AcC	U017-020-000	PETERBOROUGH, TOWN OF			1 GROVE ST	PETERBOROUGH	NH	03458	38 GROVE ST
0.33AcC	U017-048-000	US POSTAL SERVICE			GROVE ST	PETERBOROUGH	NH	03458	GROVE ST
0.18+/- Ac	U017-049-000	21 GROVE STREET LLC	HEDSTROM & JANE PA		21 GROVE STREET	PETERBOROUGH	NH	03458	00021 GROVE STREET
0.59+/- Ac	U017-050-000	21 GROVE ST, LLC			PARKING LOT "A " AT 21 GROVE ST	PETERBOROUGH	NH	03458	GROVE ST
0.76AcC	U017-051-000	PETERBOROUGH HISTORICAL SOCIETY			19 GROVE ST	PETERBOROUGH	NH	03458	00019 GROVE ST
0.29AcC	U017-052-000	PETERBOROUGH, TOWN OF			1 GROVE ST	PETERBOROUGH	NH	03458	1 GROVE ST
3.79+/- Ac	U017-053-000	PHOENIX LANE LLC			70 MAIN ST	PETERBOROUGH	NH	03458	00070 MAIN ST
0.15AcC	U017-068-000	W. BRUCE HUNTER REVOCABLE TRUST	SUZANNE I. HUNTER REVOCABLE TRUST	HUNTER, W. BRUCE & SUZANN	PO BOX 443	PETERBOROUGH	NH	03458	6 SCHOOL STREET
0.03AcC	U017-069-000	GRAVES, MARY T			PO BOX 364	PETERBOROUGH	NH	03458	DEPOT ST
0.09AcC	U017-070-000	RYMES, JAMES T			2 MAIN STREET	ANTRIM	NH	03440	DEPOT ST
0.39AcC	U017-071-000	PETERBOROUGH, TOWN OF			1 GROVE ST	PETERBOROUGH	NH	03458	DEPOT ST
0.11AcC	U017-072-000	JOURNEYS IN EDUCATION REALTY CORP			26 MAIN STREET	PETERBOROUGH	NH	03458	00026 MAIN STREET
0.13AcC	U017-073-000	CARR, RUTH E			BOX 158	PETERBOROUGH	NH	03458	00028 MAIN ST
0.13AcC	U017-074-000	ANDERSON ON MAIN LLC			40 MAIN STREET	PETERBOROUGH	NH	03458	00040 MAIN ST
0.14AcC	U017-075-000	GRANITE BLOCK CORPORATION			44 MAIN STREET	PETERBOROUGH	NH	03458	MAIN & GROVE STS
0.21AcC	U017-076-000	FTFL REALTY COMPANY	% FERNALD TAFT FALBY & LITTLE PA		PO BIX 269	PETERBOROUGH	NH	03458	00014 GROVE ST
0.47AcC	U017-077-000	TWENTY GROVE STREET PARTNERS LLC	C/O TURNER, JOHN		20 GROVE ST	PETERBOROUGH	NH	03458	00020 GROVE ST

Peterborough Downtown LID

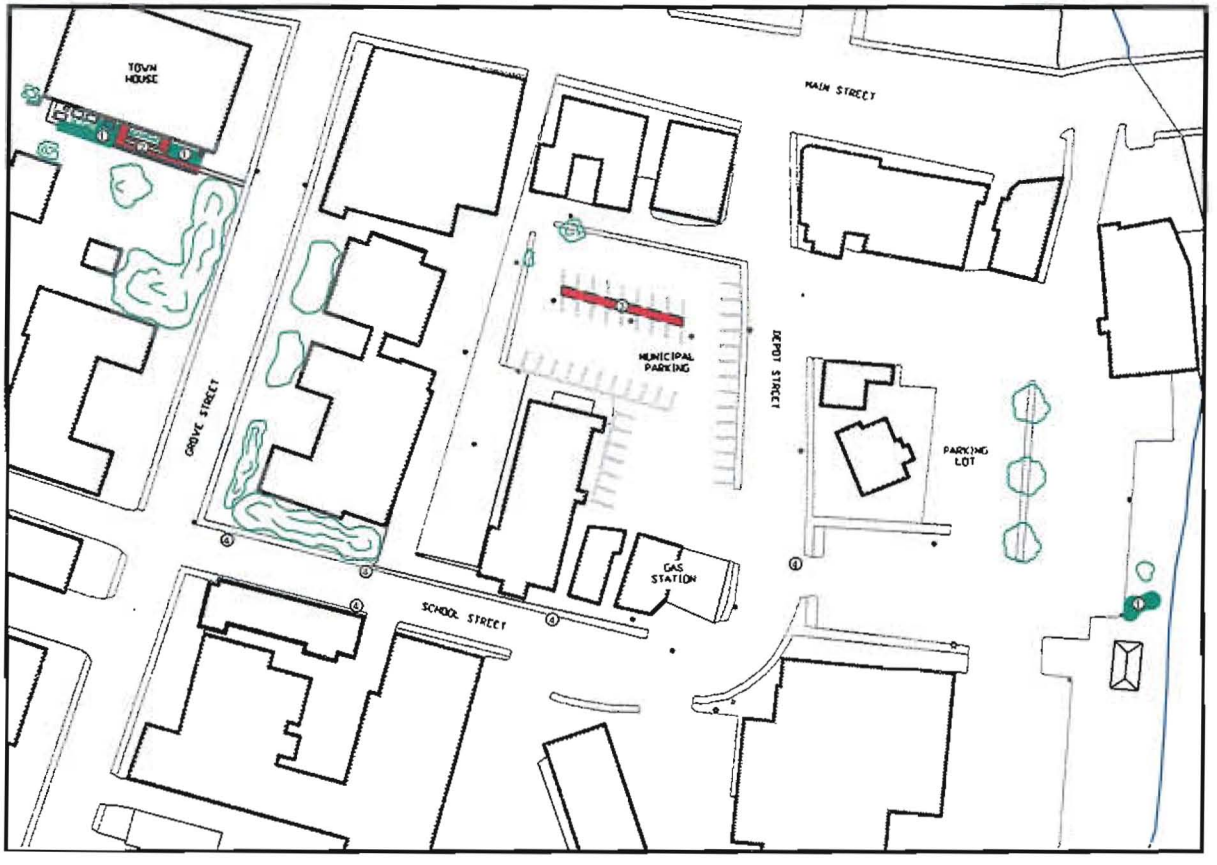
Meetings

December 3rd & 4th, 2007

Handout Materials

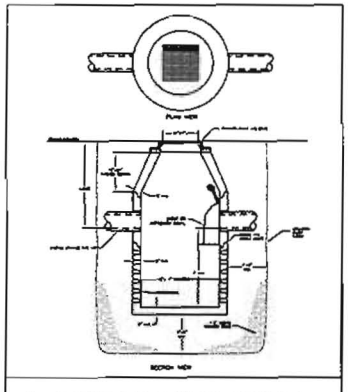


1. TYPICAL RAINGARDEN



2. BRICK WALKWAY

3. POROUS PAVER STRIP



4. INFILTRATION BASIN

Town of Peterborough

Contoocook River Urban Stormwater Improvements and Low Impact Development (LID) Demonstration Project Summary

Grant Type- NH DES Watershed Assistance Grant

Amount- $104,990 (total project cost $176,300, $71,310 local match)

Project Goal- The goal of this project is to prevent non-point source pollutants originating from stormwater runoff in the downtown area of Peterborough, NH from entering the Contoocook River by retrofitting various locations throughout the down town area with LID techniques.

Proposed BMPs-

The project includes the following:

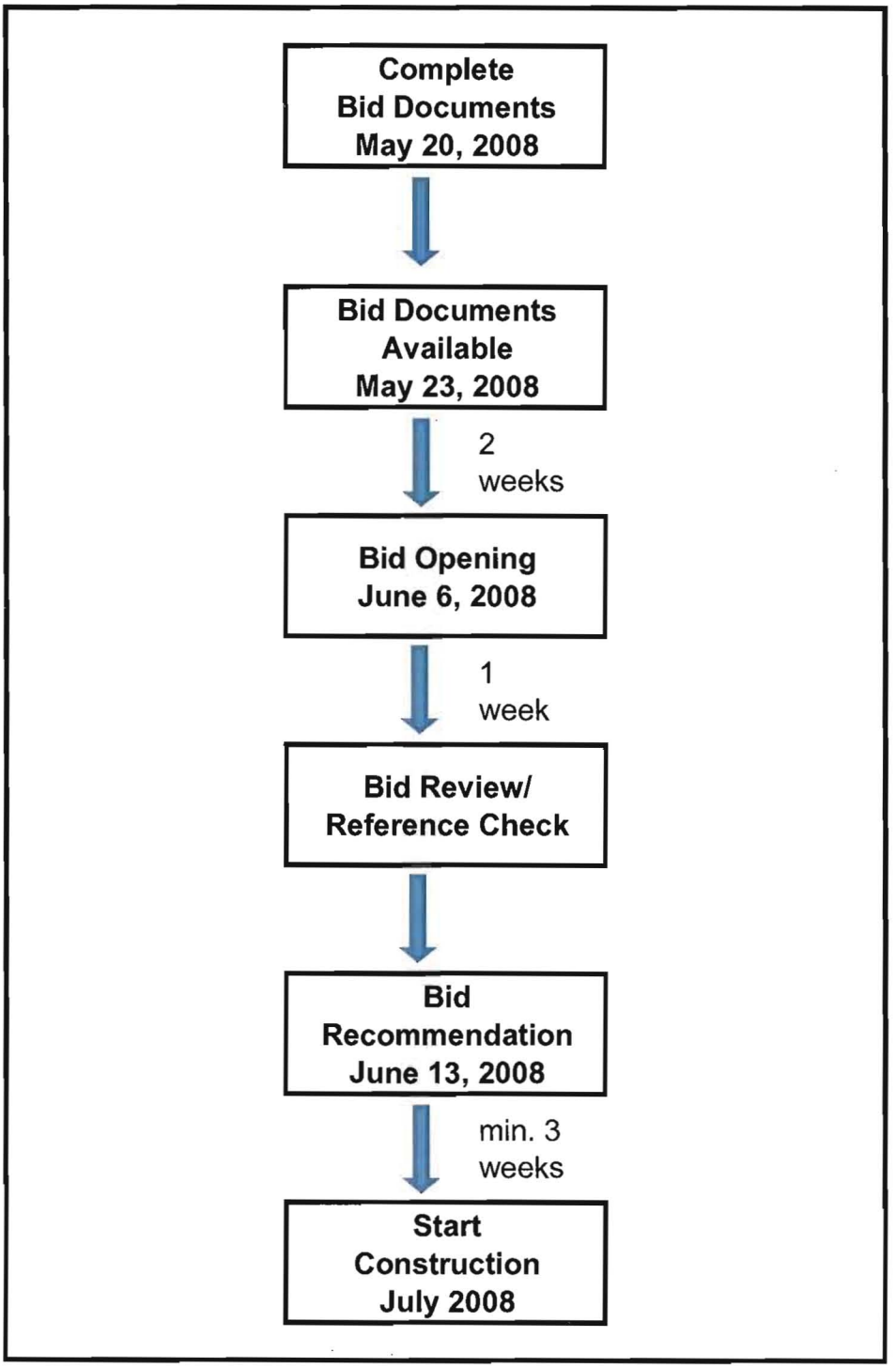
- The replacement of five existing catch basins along School and Depot Streets with five Leaching Catch Basins designed to provide enhanced treatment of storm water as well as promote infiltration and recharge of underlying groundwater which has historically been starved due to the addition of impervious surfaces such as pavement, walks and buildings.
- The installation of a landscaped Raingarden in the municipal parking lot adjacent to the Toadstool Book Store designed to accept stormwater runoff and provide treatment while also providing an attractive landscape feature with no need for irrigation. This garden will be a demonstration of ecological landscaping.
- The installation of a strip of porous pavers within the municipal parking lot adjacent to the Peterborough Community Theater designed to promote infiltration to underlying groundwater, eliminate a longstanding drainage issue and replace the impervious parking lot asphalt with a structurally sound porous alternative.
- The installation of a series of Raingardens and underground pipes on the southern side of the Town House designed to infiltrate the roof runoff from the Town House into the underlying groundwater instead of piping it to the storm sewers and ultimately the river.
- The Water Resources Committee will develop and implement a public outreach plan aimed at establishing positive behavior among downtown business owners and DPW staff with the goal of reducing stormwater and nonpoint source (NPS) pollution impacts to the Contoocook River.
- Purchase and installation of a kiosk or brochure display as well as development of informational materials to promote storm water pollution awareness and LID techniques.

In-kind services provided by Town staff and the Water Resources Committee via project development and oversight reduce the cash portion of the Town’s financial match.

Town of Peterborough,NH

Downtown LID, Drainage and Landscaping Improvements

Draft Bidding Schedule



APPENDIX B

COMPREHENSIVE ENVIRONMENTAL INC

MONITORING LOG

DATE(S):	9/6-9/7/08	FOLLOW-UP	9/8/08
PROJECT:	CONTOCOOK RIVER LID BMPs		
	PETERBOROUGH, NH		
INSPECTOR:	M. LUNDSTED		
WEATHER:	HEAVY RAINS OVER ~ 24 HRS.		
RAIN AMT.:	4.9" (weather.gov/climate)		
BMP LOCATION/ DESCRIPTION:	① PILOT RAINGARDEN (UNPLANTED)		
OBSERVATIONS:	① PONDED WATER OBSERVED DURING		
	STORM WAS NOT PRESENT AT INSP.		
	ON 9/8/08; NO EROSION OF BED.		
NOTES:	① BMP INFILTRATING IN LESS THAN		
	36 HRS.		

SKETCH (IF APPLICABLE)

N/A

COMPREHENSIVE ENVIRONMENTAL INC

MONITORING LOG

DATE(S):	10/25-10/26/08	FOLLOW-UP	10/26/08 10AM
PROJECT:	CONTOCOOK RIVER LID BMPs		
	PETERBOROUGH, NH		
INSPECTOR:	M. LUNDSTED		
WEATHER:	RAIN OVERNIGHT 10/25-10/26		
RAIN AMT.:	0.76" (weather.gov/climate)		
BMP LOCATION/ DESCRIPTION:	① TOWN HOUSE RAINGARDENS/INFIL. BEDS		
	② PILOT RAINGARDEN		
OBSERVATIONS:	① INSPECTED PERVIOUS SIDEWALK &		
	RAINGARDEN OVERFLOW PIPES-NO STANDING		
	WATER ② SAME - NO STANDING WATER		
NOTES:	① & ② .76" STORM INFILTRATED		
	COMPLETELY W/IN 10 HRS.		

SKETCH (IF APPLICABLE)

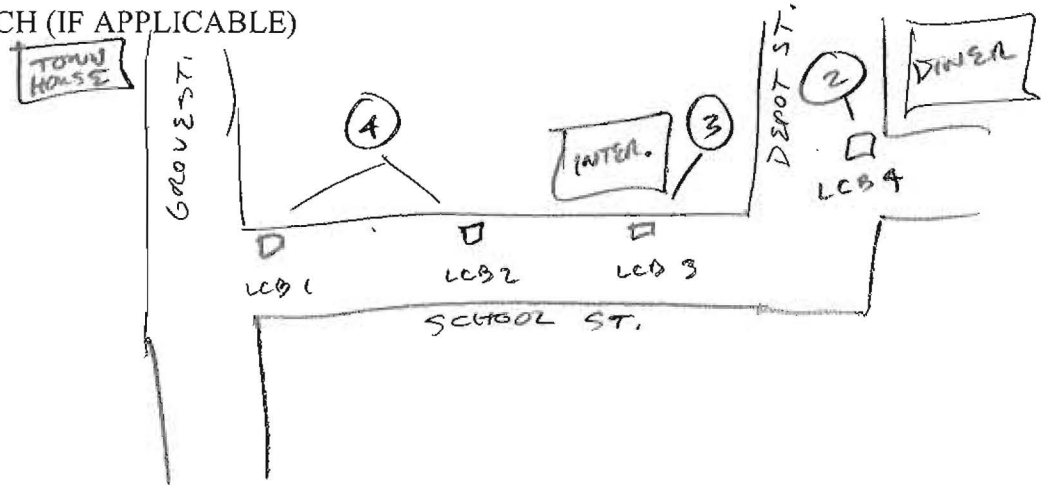
N/A

COMPREHENSIVE ENVIRONMENTAL INC

MONITORING LOG

DATE(S):	11/25-11/26/08	FOLLOW-UP	11/26/08
PROJECT:	CONTOOCOOK RIVER LID BMPS PETERBOROUGH, NH		
INSPECTOR:	MATT LUNDSTED		
WEATHER:	HEAVY RAINS		
RAIN AMT.:	1.74" (WEATHER.GOV/CLIMATE)		
BMP LOCATION/ DESCRIPTION:	(1) P. LOT RAIN GARDEN (2) LCB @ MUNIC. LOT @ DINER (3) LCB @ INTERMEZZO (4) LCB @ SCHOOL/GROVE ST		
OBSERVATIONS:	(1) STANDING WATER DURING STORM 11/25 IS GONE 11/26. (WITHIN 24 HRS.) (2) 11/26 AM WATER LEVEL IS 2' BELOW OUTLET (3) 11/26 AM WATER LEVEL IS 4' BELOW OUTLET (4) 2 LCBS ARE DRY (11/26 - AM)		
NOTES:	ALL BMPS CONTINUE TO INFILTRATE W/ IN 24 HRS.		

SKETCH (IF APPLICABLE)

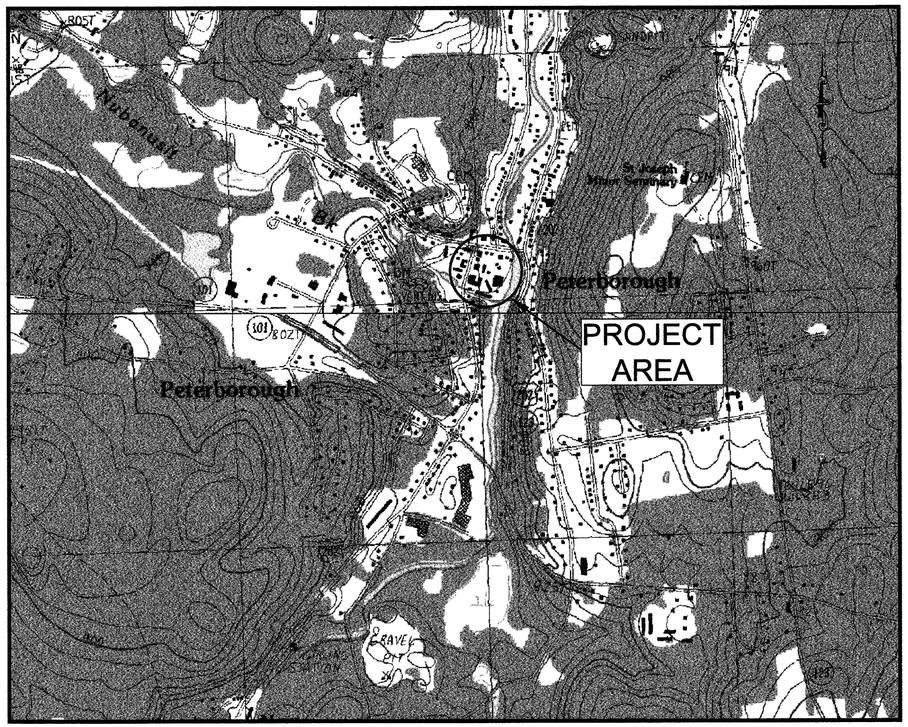


APPENDIX C

TOWN OF PETERBOROUGH, NEW HAMPSHIRE

CONTOOCOOK RIVER STORMWATER IMPROVEMENTS

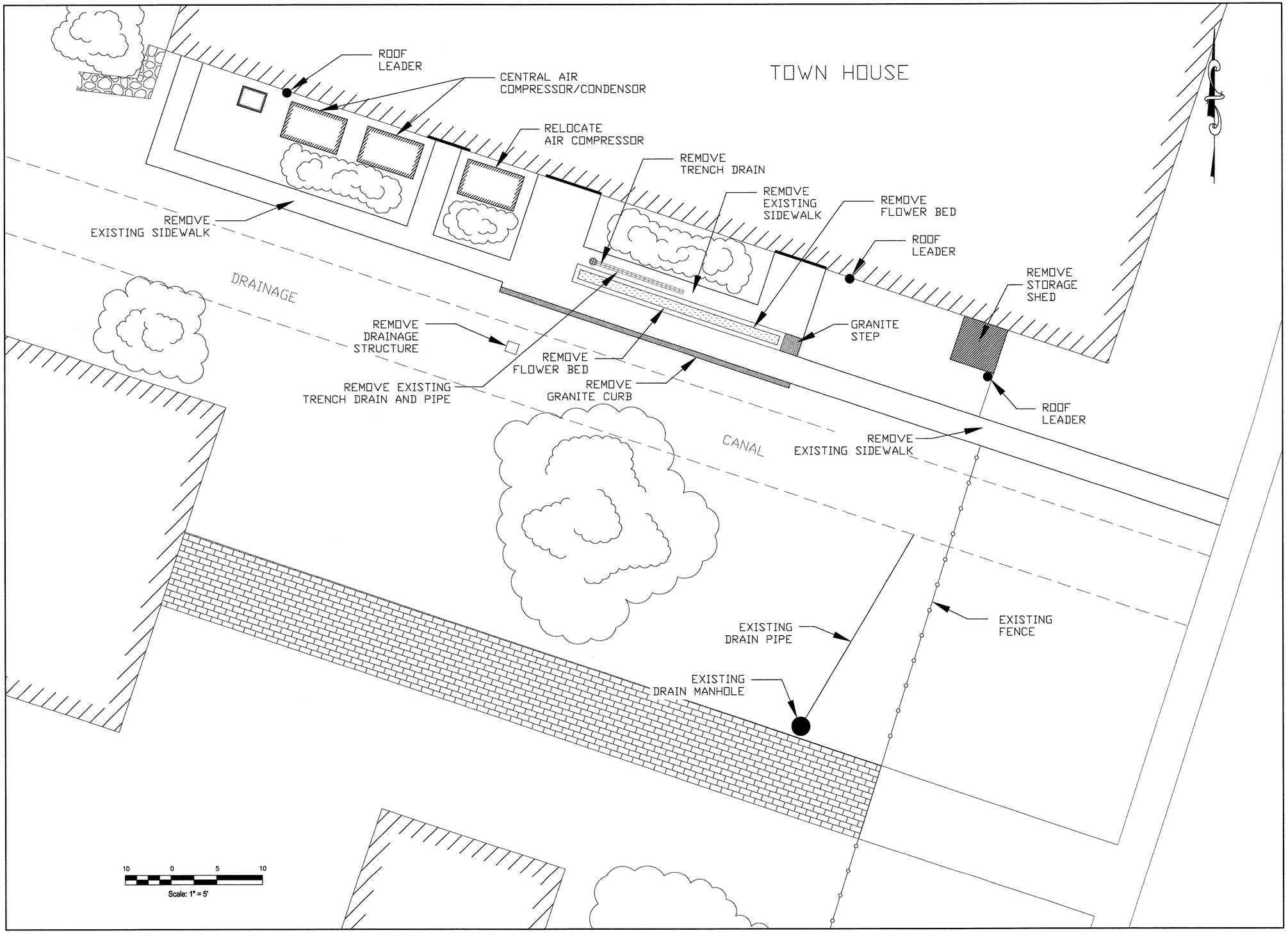
MAY 2008



SHEET	TITLE
C-1	LOWER TOWN HOUSE EXISTING CONDITIONS
C-2	LOWER TOWN HOUSE PROPOSED DRAINAGE IMPROVEMENTS
C-3	LOWER TOWN HOUSE DRAINAGE DETAILS
C-4	SIDEWALK AND BRICK WALL DETAILS
C-5	SCHOOL STREET & MUNICIPAL PARKING PROPOSED DRAINAGE IMPROVEMENTS

STATE OF NEW HAMPSHIRE
RICHARD C. COTE NO. 9767 LICENSED PROFESSIONAL ENGINEER

COMPREHENSIVE ENVIRONMENTAL INCORPORATED • MERRIMACK, NEW HAMPSHIRE



LOWER TOWN HOUSE
PLAN VIEW

General Notes

1. DRAWINGS BASED ON SURVEY WITH ASSUMED DATUM.

2. THE LOCATION OF UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED OR INSPECTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT 'DIG-SAFE' AT 1-888-344-7233 AND THE PETERBOROUGH UTILITIES DEPARTMENT.

3. ROADWAYS AND DRAINAGE STRUCTURE LOCATIONS DEPICTED ON THIS MAP ARE APPROXIMATE AND MUST BE VERIFIED BY THE CONTRACTOR. THE LOCATION AND DEPTH OF DRAINAGE PIPES SHOWN ON THESE PLANS ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

4. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION TO PREVENT ANY DAMAGE TO ADJACENT PROPERTIES. ALL AREAS WHICH ARE AFFECTED BY THE CONTRACTOR'S OPERATIONS SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER, AT NO ADDITIONAL COST TO THE OWNER.

5. ANY CHANGE IN FIELD CONDITIONS SHALL BE REPORTED TO THE ENGINEER TO INSURE THAT ANY MODIFICATIONS TO THE ORIGINAL DESIGN ARE PROPER AND ADEQUATE TO SERVE THE PROJECT'S NEEDS AND COMPLY WITH THE APPLICABLE STANDARDS AND REGULATIONS.

6. EROSION CONTROL SUCH AS SILT FENCE AND/OR HAY BALES SHALL BE INSTALLED TO PREVENT SEDIMENT FROM ENTERING STREAMS OR RESOURCES AREAS.

STATE OF NEW HAMPSHIRE — RICHARD C. CYR No. 9767 — LICENSED PROFESSIONAL ENGINEER

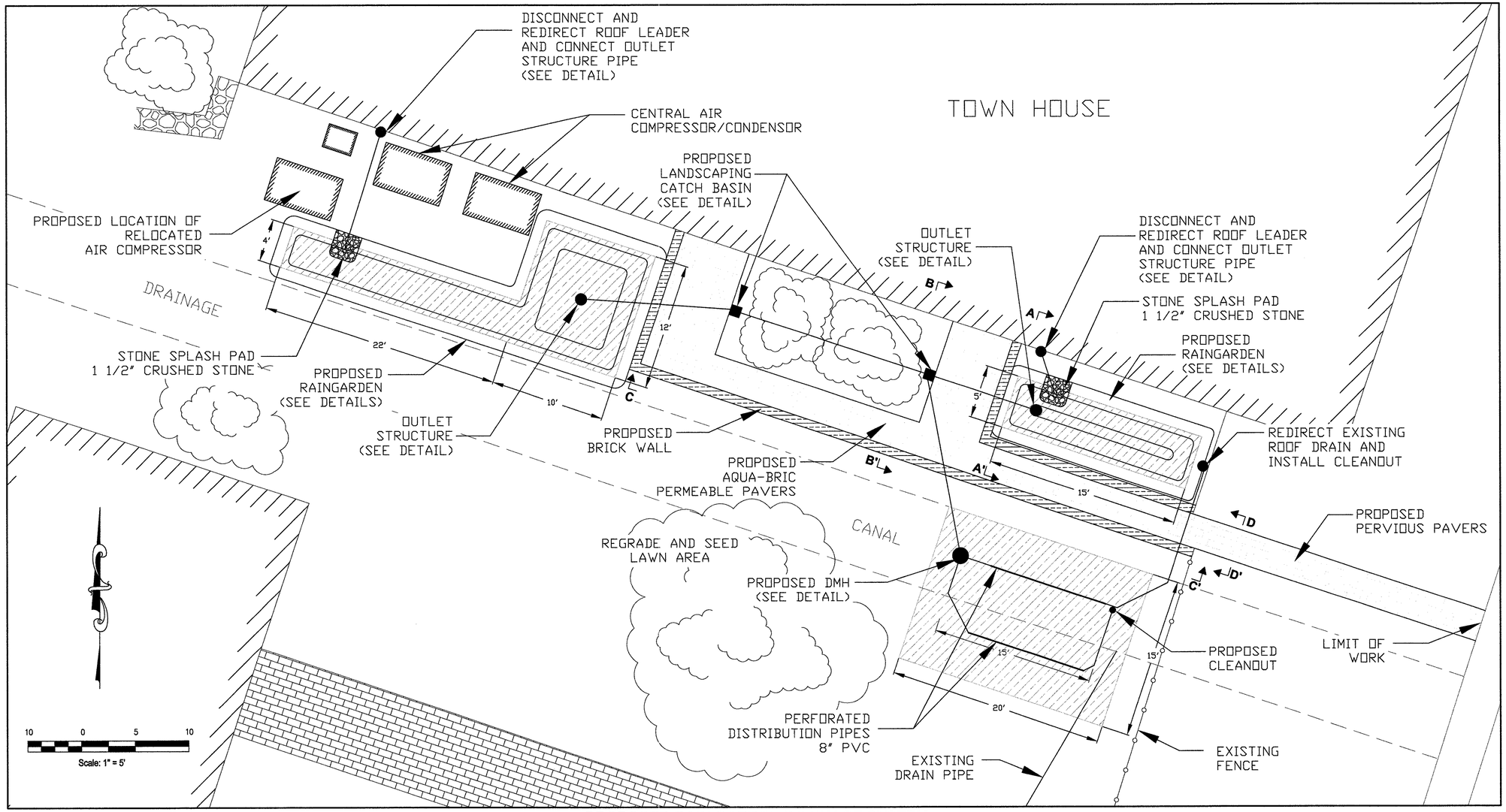
DIG SAFE — 1-888-DIG-SAFE

No.	Revision/Issue	Date

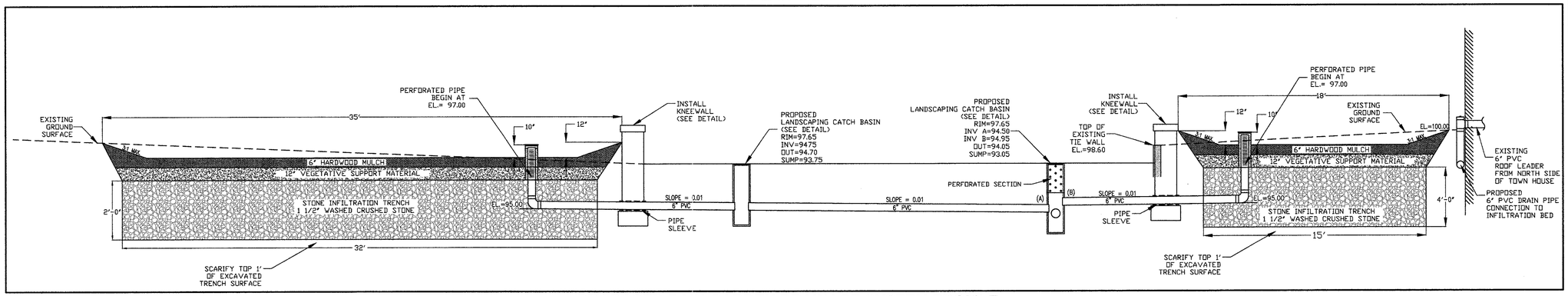
COMPREHENSIVE ENVIRONMENTAL INCORPORATED
21 DEPOT STREET, MERRIMACK, NH 03054

LOWER TOWN HOUSE EXISTING CONDITIONS

Project No.: 185-8	Sheet
Date: MARCH 2008	C-1
Drawn By: CB	
Checked By: ML	
Scale: As Shown	



PROPOSED RAIN GARDEN DRAINAGE SYSTEM
PLAN VIEW



PROPOSED RAIN GARDEN DRAINAGE SYSTEM PROFILE
NOT TO SCALE

General Notes

1. DRAWINGS BASED ON SURVEY WITH ASSUMED DATUM.

2. THE LOCATION OF UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED OR INSPECTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT "DIG-SAFE" AT 1-888-344-7233 AND THE PETERBOROUGH UTILITIES DEPARTMENT.

3. ROADWAYS AND DRAINAGE STRUCTURE LOCATIONS DEPICTED ON THIS MAP ARE APPROXIMATE AND MUST BE VERIFIED BY THE CONTRACTOR. THE LOCATION AND DEPTH OF DRAINAGE PIPES SHOWN ON THESE PLANS ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

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5. ANY CHANGE IN FIELD CONDITIONS SHALL BE REPORTED TO THE ENGINEER TO INSURE THAT ANY MODIFICATIONS TO THE ORIGINAL DESIGN ARE PROPER AND ADEQUATE TO SERVE THE PROJECT'S NEEDS AND COMPLY WITH THE APPLICABLE STANDARDS AND REGULATIONS.

6. EROSION CONTROL SUCH AS SILT FENCE AND/OR HAY BALES SHALL BE INSTALLED TO PREVENT SEDIMENT FROM ENTERING STREAMS OR RESOURCES AREAS.

STATE OF NEW HAMPSHIRE — RICHARD C. COTE No. 9787 LICENSED PROFESSIONAL ENGINEER

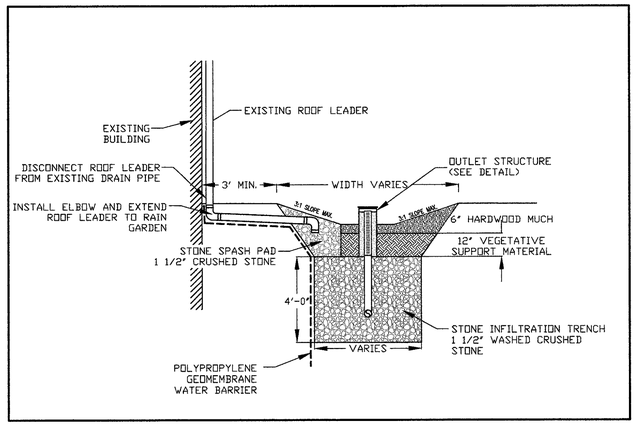
DIG SAFE — 1-888-DIG-SAFE

No.	Revision/Issue	Date
1	WRC COMMENTS	4/08

COMPREHENSIVE ENVIRONMENTAL INCORPORATED
21 DEPOT STREET, MERRIMACK, NH 03054

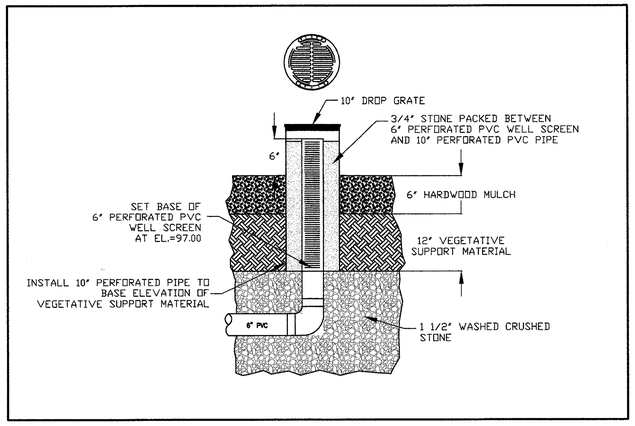
LOWER TOWN HOUSE PROPOSED DRAINAGE IMPROVEMENTS

Project No.: 185-8	Sheet
Date: MARCH 2008	C-2
Drawn By: CB	
Checked By: ML	
Scale: As Shown	



ROOF LEADER DETAIL (A-A')

NOT TO SCALE



OUTLET STRUCTURE DETAIL

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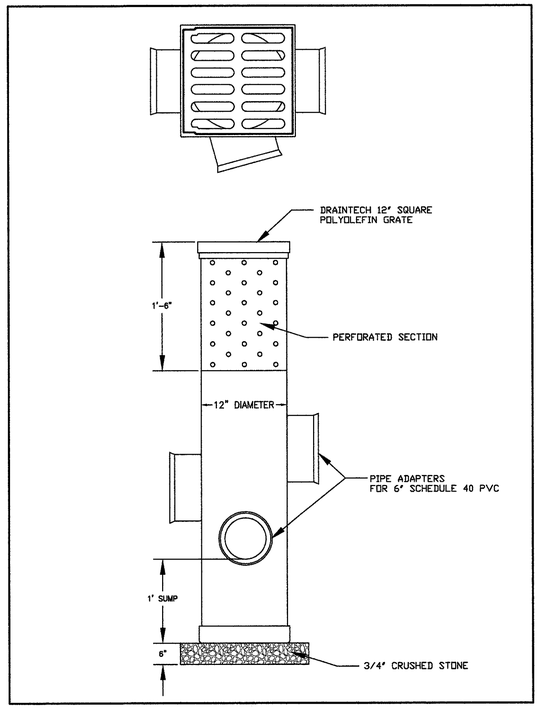

PREFABRICATED NYLOPLAST LANDSCAPING CATCH BASIN (OR APPROVED EQUAL)

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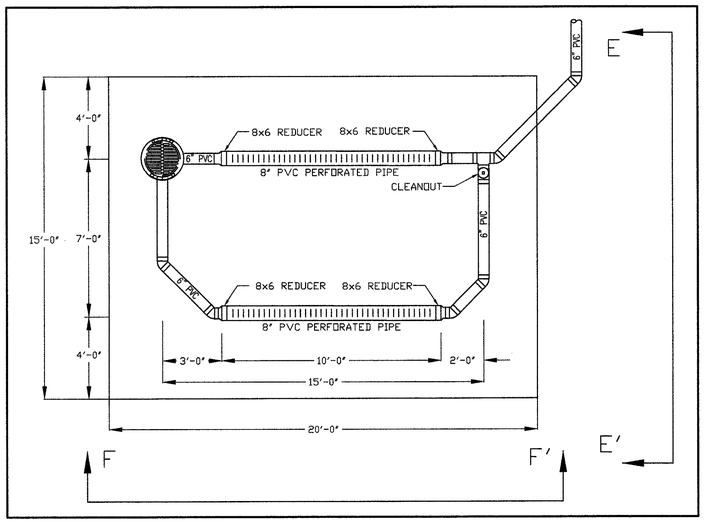
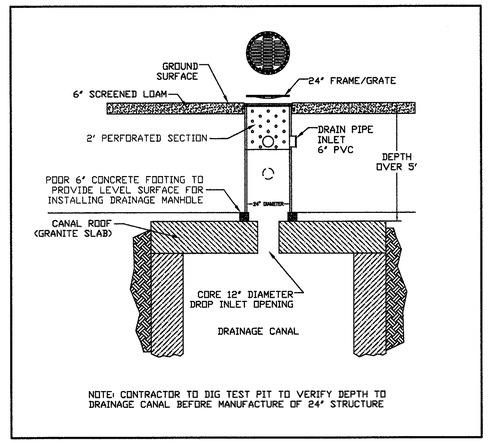


ROOF LEADER STONE INFILTRATION BED PLAN VIEW

NOT TO SCALE



PREFABRICATED NYLOPLAST OUTLET STRUCTURE (OR APPROVED EQUAL)

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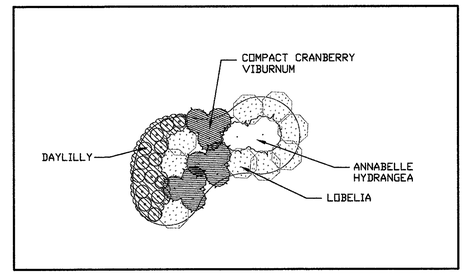
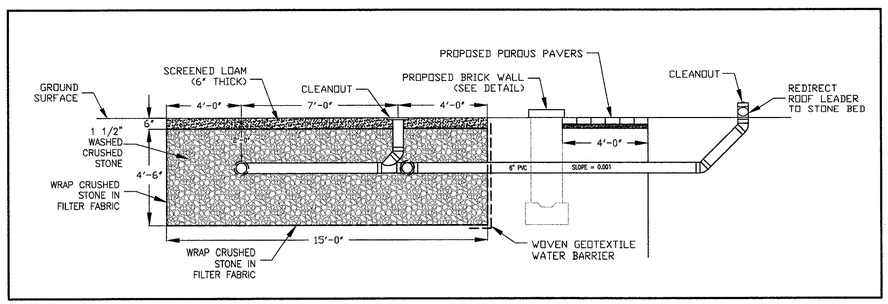


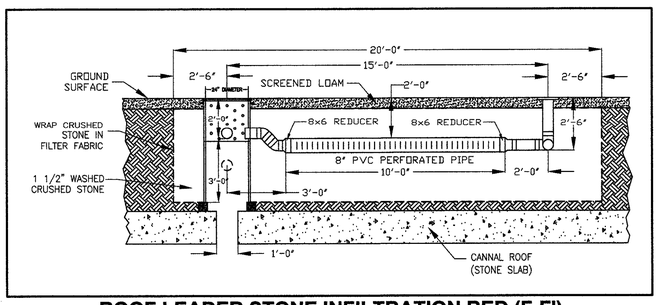
TYPICAL RAIN GARDEN PLANTS

NOT TO SCALE



ROOF LEADER STONE INFILTRATION BED (E-E')

NOT TO SCALE



ROOF LEADER STONE INFILTRATION BED (F-F')

NOT TO SCALE

General Notes

1. DRAWINGS BASED ON SURVEY WITH ASSUMED DATUM.

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STATE OF NEW HAMPSHIRE — RICHARD D. COTE No. 9767 LICENSED PROFESSIONAL ENGINEER

DIG SAFE 1-888-DIG-SAFE

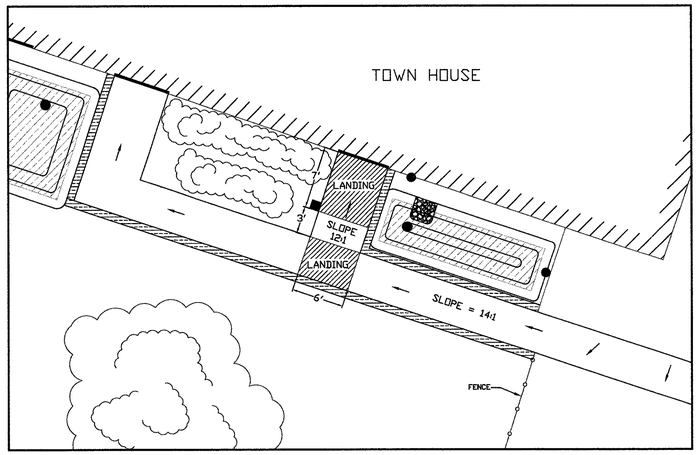
No.	Revision/Issue	Date
1	WRC COMMENTS	4/08

COMPREHENSIVE ENVIRONMENTAL INCORPORATED

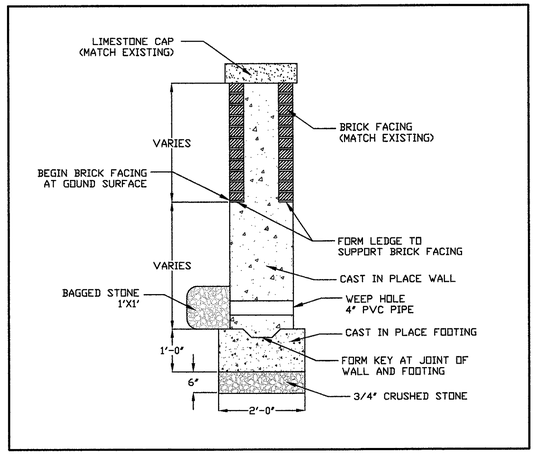
21 DEPOT STREET, MERRIMACK, NH 03054

LOWER TOWN HOUSE DRAINAGE DETAILS

Project No.: 185-8	Sheet
Date: MARCH 2008	C-3
Drawn By: CB	
Checked By: WL	
Scale: As Shown	



SIDEWALK PLAN
NOT TO SCALE



BRICK WALL PROFILE
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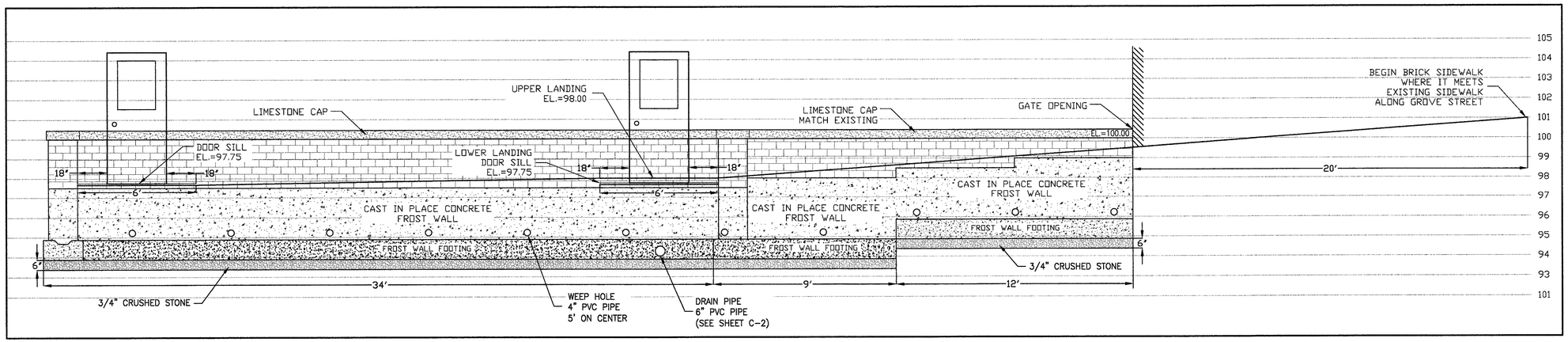
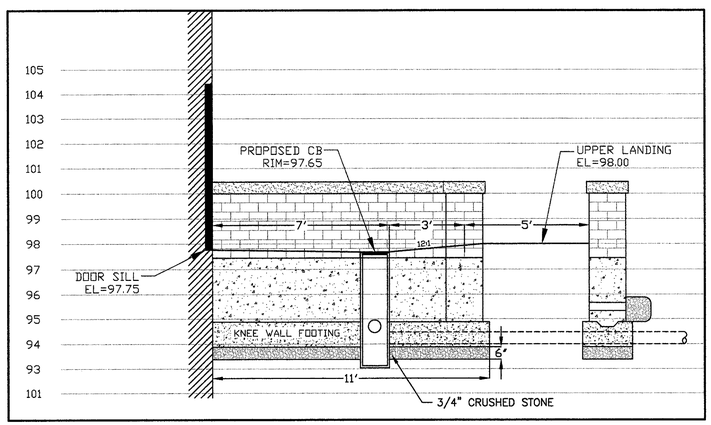


SIDEWALK PROFILE (C-C')
NOT TO SCALE



SIDEWALK PROFILE (B-B')
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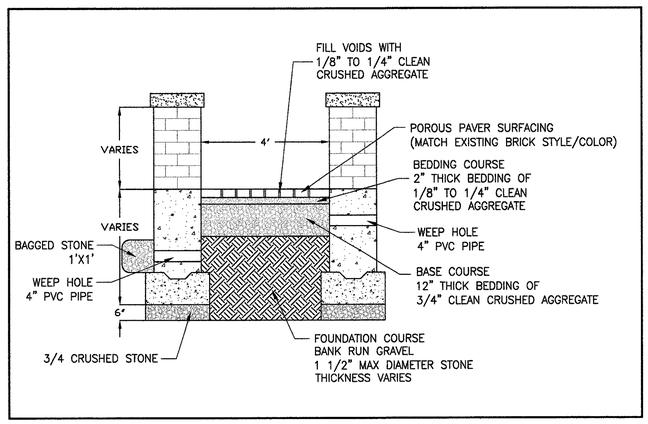

SIDEWALK PROFILE (D-D')
NOT TO SCALE

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STATE OF NEW HAMPSHIRE
RICHARD P. COTE
No. 9797
LICENSED PROFESSIONAL ENGINEER

DIG SAFE
1-888-DIG-SAFE

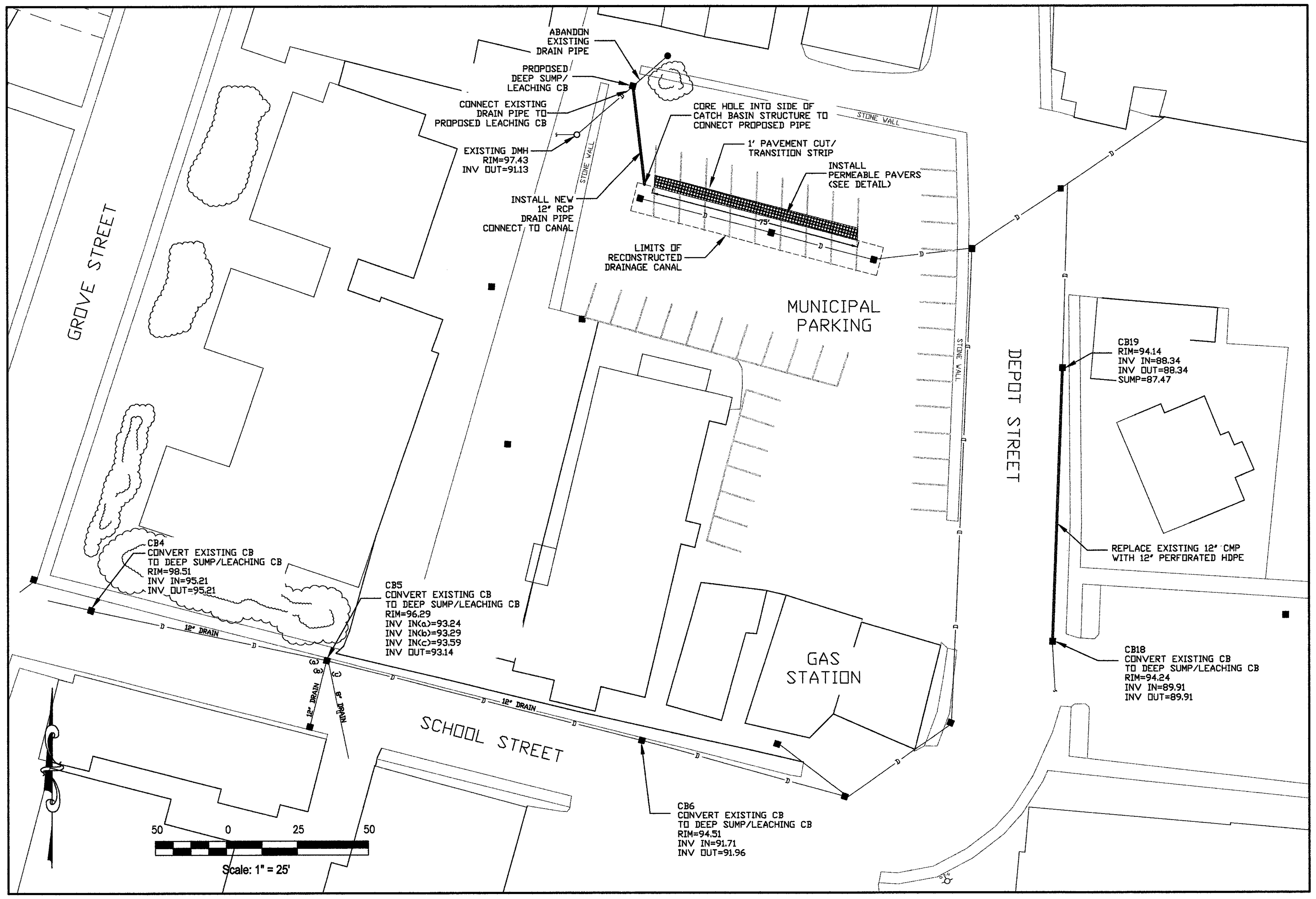
No.	Revision/Issue	Date

COMPREHENSIVE ENVIRONMENTAL INCORPORATED
21 DEPOT STREET, MERRIMACK, NH 03054

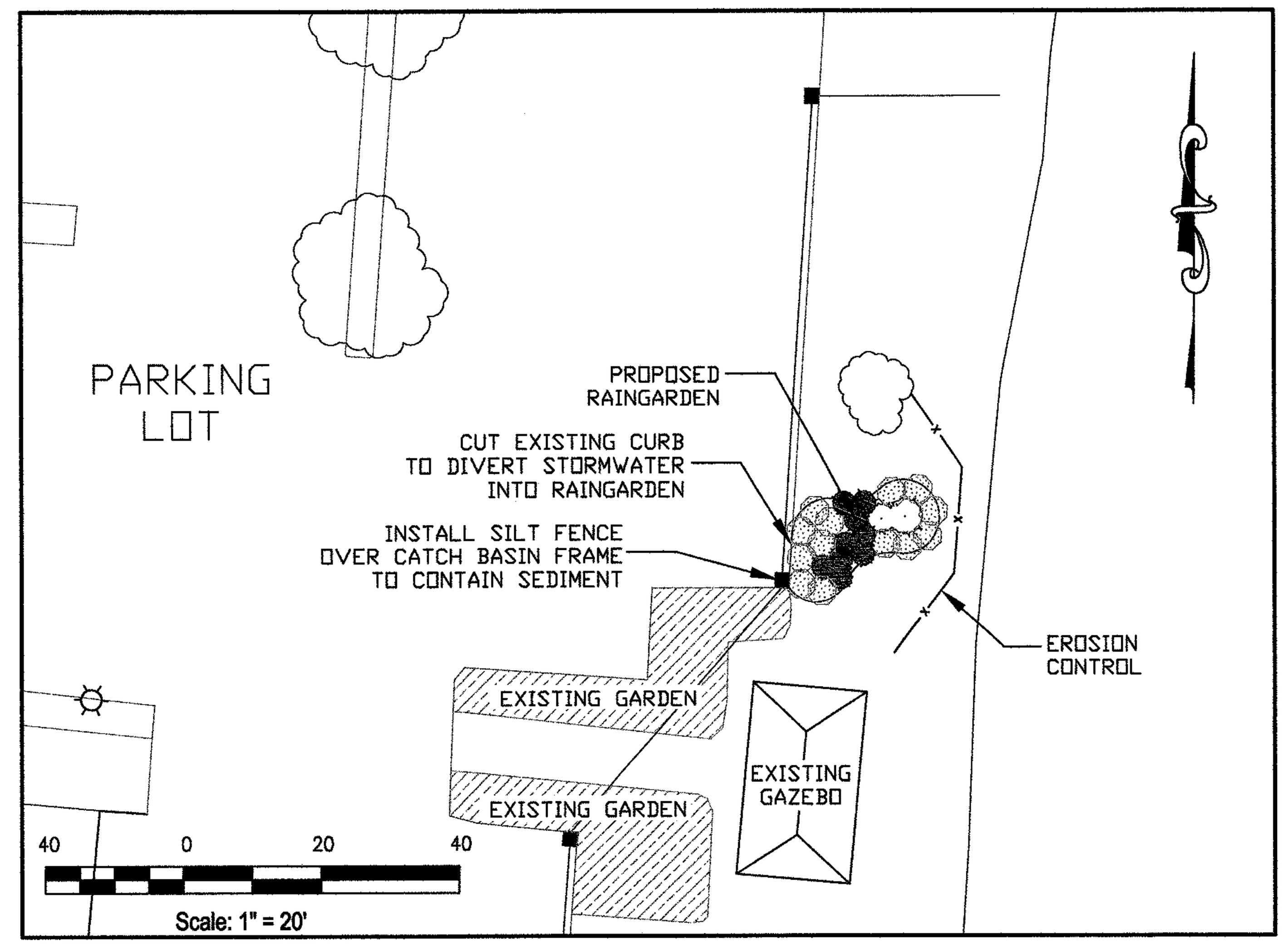
SIDEWALK AND BRICK WALL DETAILS DETAILS

Project No.: 185-8
Date: MARCH 2008
Drawn By: CB
Checked By: ML
Scale: As Shown

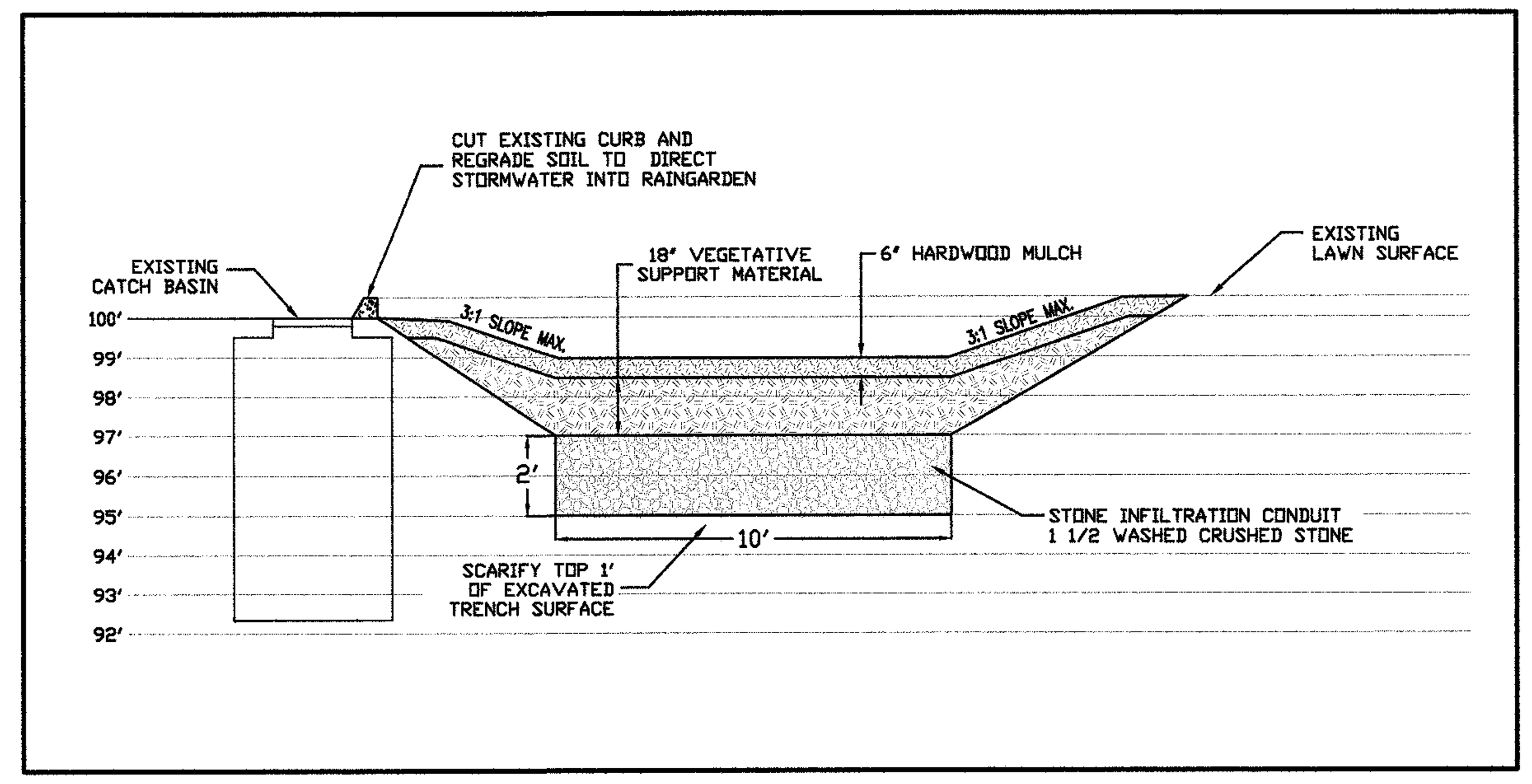
Sheet
C-4



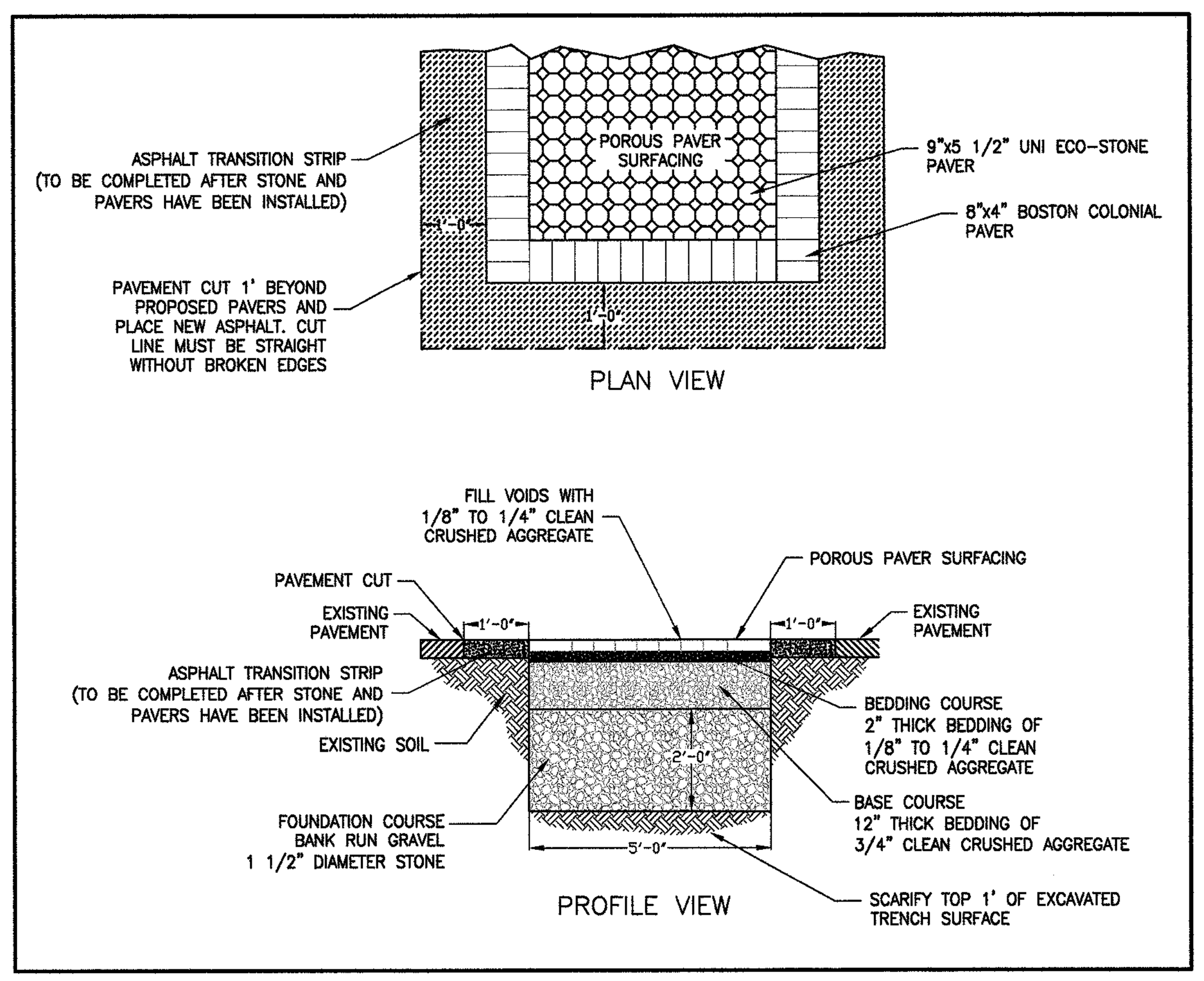
DRAINAGE IMPROVEMENT PLAN VIEW



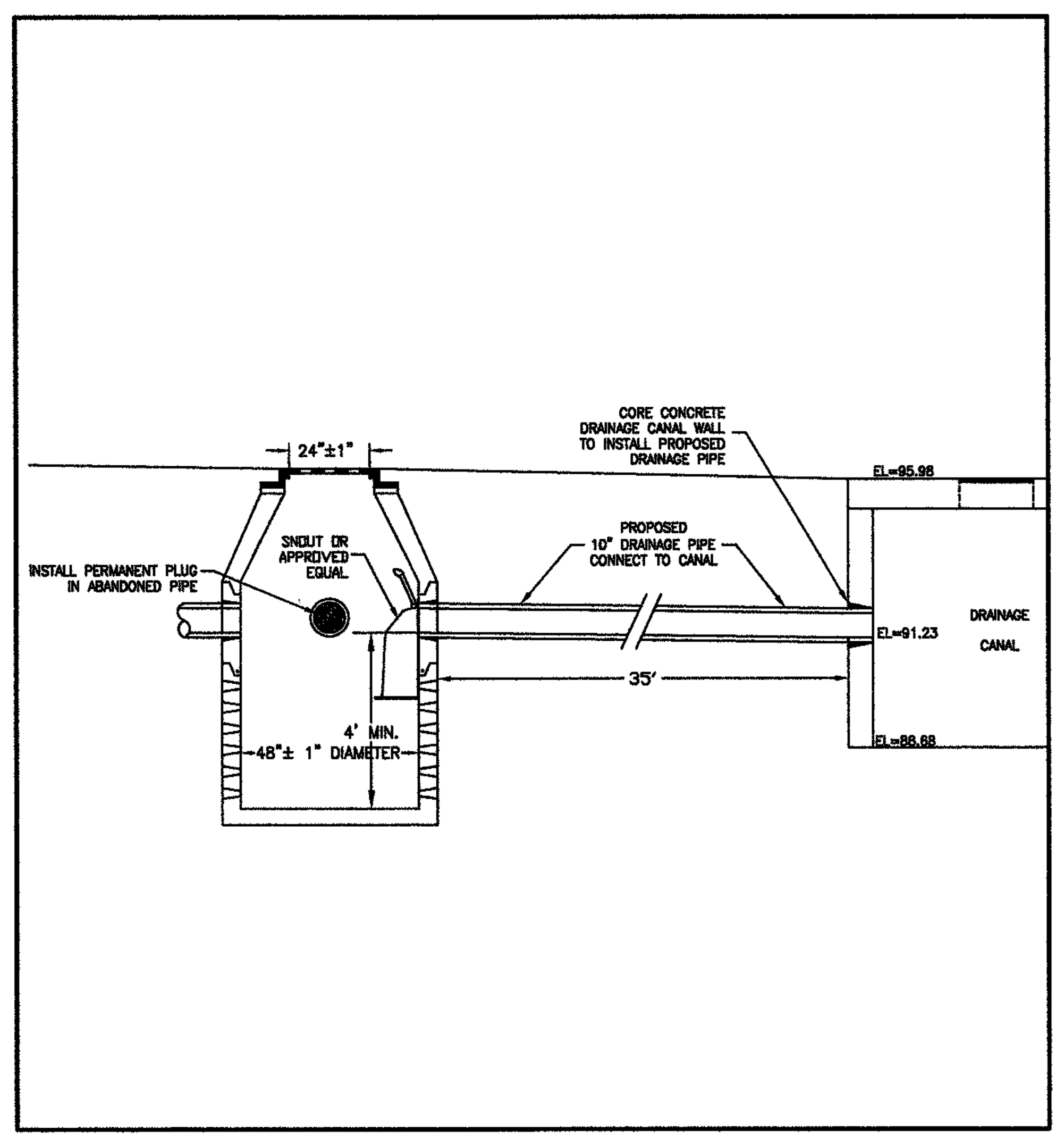
PARKING LOT RAINGARDEN PLAN VIEW



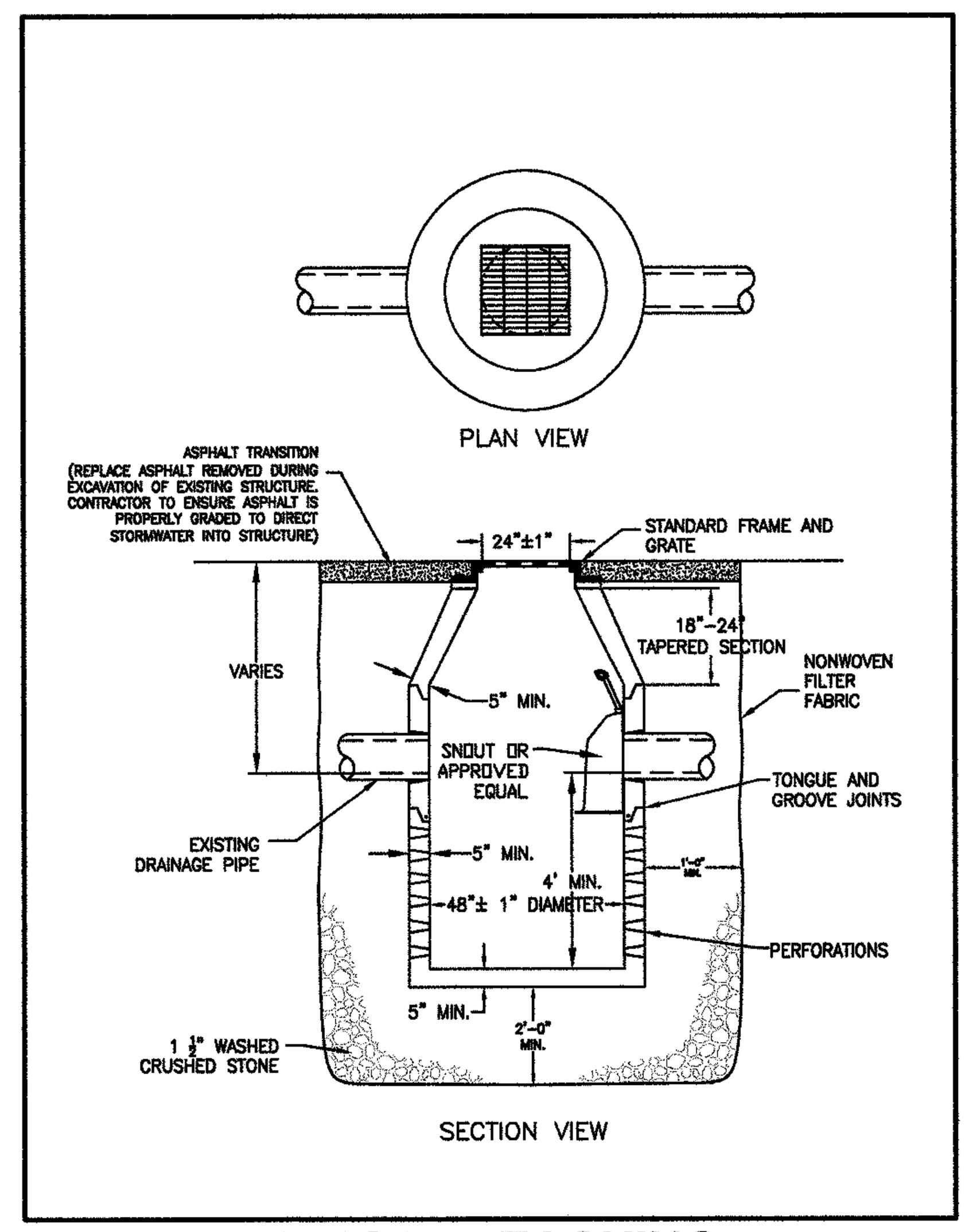
RAINGARDEN PROFILE



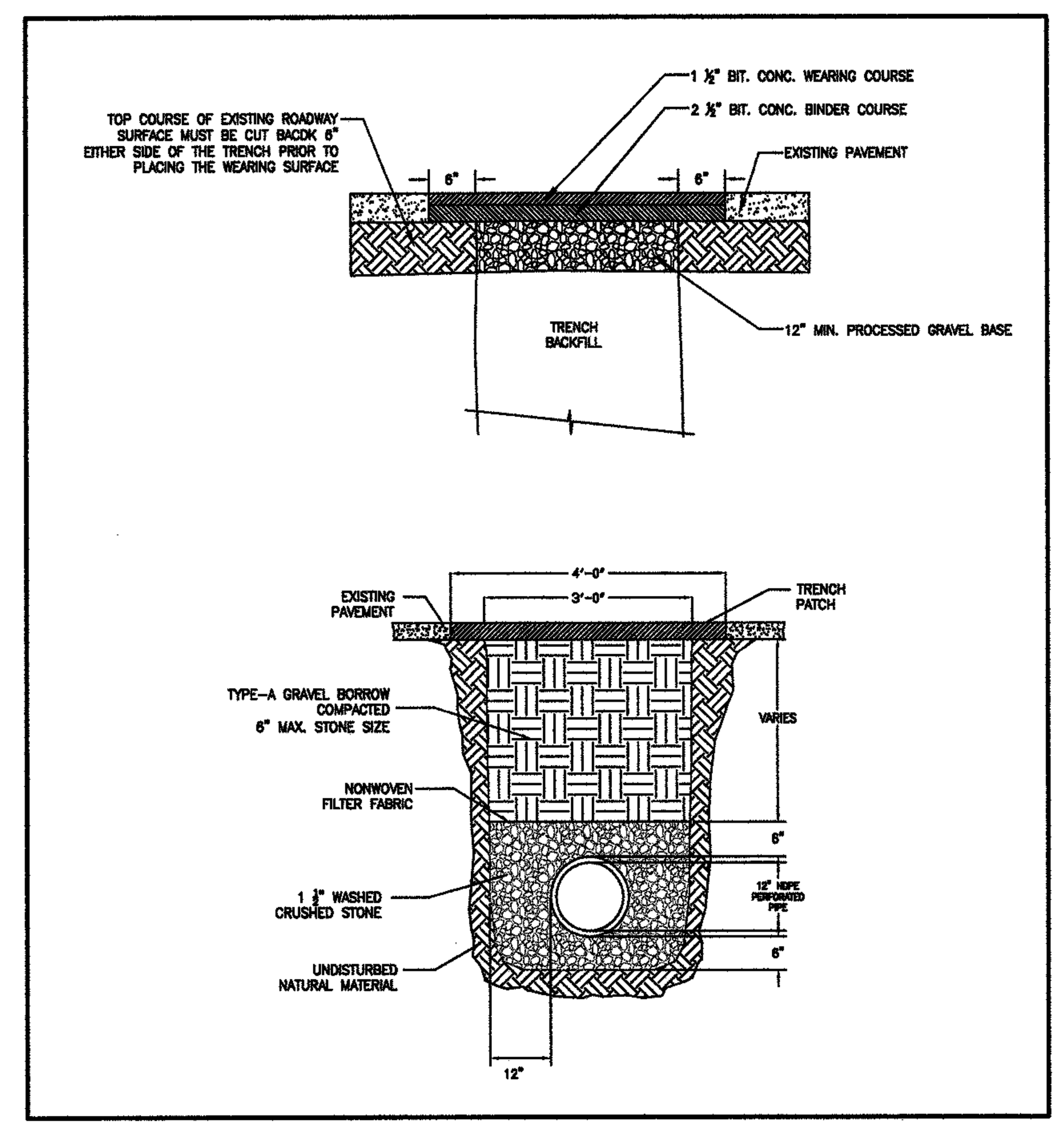
PARKING LOT PERMEABLE PAVERS
NOT TO SCALE



DRAINANGE PIPE CONNECTION TO DRAINAGE CANNAL STRUCTURE
NOT OT SCALE



TYPICAL LEACHING CATCH BASIN
NOT TO SCALE



TYPICAL TRENCH DETAIL
NOT OT SCALE

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DIG SAFE 1-888-DIG-SAFE

No.	Revision/Issue	Date

COMPREHENSIVE ENVIRONMENTAL INCORPORATED
21 DEPOT STREET, MERRIMACK, NH 03054

SCHOOL STREET & MUNICIPAL PARKING PROPOSED DRAINAGE IMPROVEMENTS

Project No.: 185-8	Sheet
Date: MARCH 2008	
Drawn By: CB	C-5
Checked By: ML	
Scale: As Shown	